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EDITORIAL

The report on the 1947-48 rice season in Malaya, published in this issue, makes encouraging reading. The acreage planted with padi was the largest on record, being 64,000 acres greater than in the 1940-41 season which had the previous record planted area. The total yield of padi exceeded that of the 1940-41 season, and was not far short of the record seasons 1935-36, 1938-39 and 1939-40.

The estimated rice production of 343,065 tons also created a record. It is, however, not strictly comparable with previous years since a higher percentage has been adopted for the conversion rate of padi to milled rice, and this higher percentage accounts for 16,000 tons. Licensed millers were required by Government to mill to a minimum recovery of 63 per cent. as compared with 60 per cent. previously, so that rice production from a given quantity of padi was actually higher than in former years.

Compared with the previous season (1946-47) rice production increased by 86,000 tons, and of this increase 56,000 tons were due to the higher yield obtained per acre. The average yield of padi in the 1947-48 season was 272 gantangs per acre which is still below pre-war yields, but as improvements continue to be made to irrigation works and drainage in padi areas it may reasonably be expected that yields will similarly improve.

The Department of Agriculture has been actively engaged in selection work on padi varieties for several years in an endeavour to breed varieties which will give higher yields, while retaining other desirable qualities. Direction and co-ordination of this work is now centred in the Botanical Division of the Department, and a senior research officer is employed wholly on padi research, together with the full time assistance of a senior Malay officer appointed as Malay Research Officer primarily for this purpose.

A Malayan wide survey of padi varieties is being systematically carried out with the object of making a comparative study of varietal characteristics relevant to yielding ability and quality of rice.

Inter and intra-varietal selection also is again in progress, after the interruption of the war years, with the object of selecting varieties most suitable to particular localities and environments. Where an established popular variety is widely grown, pedigree ear-row selection of higher yielding or stronger strawed strains is being carried out, as already with Radin Ebos in Kedah, with Serendah Kuning in Negri Sembilan and neighbouring territories, and with Nachin in the Malacca coastal districts.

Although satisfactory progress is recorded in the report under consideration it will be seen that local production still represents only about one third of Malaya's potential consumption of rice under normal conditions of supply. Thus we need three times our present planted acreage to achieve self-sufficiency, and it will be appreciated that such an extension of the crop involves long-term planning and raises many problems. Not the least of these is man-power, and it is clear that any large-scale development will necessitate the adoption of mechanical methods of cultivation and harvesting.

Readers of this Journal are aware that the Department of Agriculture has for some time been energetically investigating the possibilities of mechanization in relation to padi cultivation, and on the results of that experimentation will largely depend a substantial increase in existing padi land unless we are to look for an increase in population to provide the necessary labour for manual methods of cultivation. This last solution could only be effective in reducing the gap between production and consumption if the increased population produced a large surplus over its own requirements. It is on mechanical methods that hopes are centred of substantially increasing the surplus of padi per cultivator.

'Blister Blight' of Tea. The attention of readers is directed to an article by the Senior Plant Pathologist, Mr. A. Thompson, on a disease of tea caused by a fungus which produces blisters on the young foliage, and later affects the leaf stalks and green twigs. Under climatic conditions favourable to the growth of the fungus the tea bushes may be seriously damaged and the loss of crop may be appreciable.

This disease appeared for the first time in Ceylon and South India in 1946 and is at present causing concern on highland estates where the climate is suitable for its development. Consideration of climatic conditions in Malaya, where the disease does not occur, indicates that the fungus would not affect lowland tea, but, during certain periods of the year, could do considerable damage on local highland properties if the fungus should be introduced.

When planting material is imported into a country there is always the possibility that some dangerous disease or pest may enter and become established. There have been numerous examples of this in past years, and it is in order to prevent such occurrences that the matter of plant quarantine and control of plant importations is nowadays receiving as careful attention as quarantine for medical and health purposes.

The arrival of Blister Blight in Ceylon is probably a result of increased development of air transport. In some cases spores of organisms responsible for plant disease do not remain viable for many days and may not survive a journey by slower transport, particularly if detached from their host plant, and it is therefore very important that the transfer of plants by aircraft from one country to another should be no less carefully supervised and controlled than transfer by the more usual sea and land routes.

Plant importation regulations have been in force in Malaya for many years and under present regulations no plants or planting material may be imported except as approved by the Director of Agriculture. Permission to import seed or any form of planting material of tea by air from countries where Blister Blight is known to occur, will not be given, and any importations by other routes will, if permitted, be given only under conditions which will be strictly enforced.

Pasture Grasses. Good pasture is the essential basis for breeding of good cattle. Cattle are an important ingredient of good mixed farming, and mixed farming is the most satisfactory basis for the maintenance of fertility of cultivated soil and for the growth of good crops. On this assumption studies of the optimum requirements of good pasture in Malaya have been initiated, and the brief ecological study of two of the most significant pasture grasses in Malaya, published in this issue, may be regarded as the forerunner of much further work.

Original Articles.
RICE IN MALAYA
SEASON 1947-1948

BY

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Acreages and Production.

As briefly reported in the October issue of *The Malayan Agricultural Journal* the acreage of padi planted in the 1947-48 season in Malaya constituted a record, the total of 881,304 acres for the main crop far exceeding the previous highest total of 820,480 acres planted in the 1940-41 season. This increase in acreage is due to the progress of irrigation schemes of the Drainage and Irrigation Department, to the assistance of Agricultural Officers in improvements to smaller irrigation and drainage works, to present high rice prices, and to a considerable measure of rehabilitation and re-settlement of land deserted during the Japanese occupation.

The total yield of padi approached that of the best pre-war years, and the estimated total production of rice, 343,065 tons, is the highest ever recorded. This high figure is, however, as explained later, partly due to the adoption of a higher percentage for conversion rate of padi to milled rice which Government required of millers. This requirement would not affect the home preparation of rice by the growers themselves, but it is probable that former conversion estimations for this category were too low.

The area planted with "wet" padi was 799,151 acres and with "dry" padi 82,153 acres, as compared with 732,614 acres and 80,924 acres respectively in the 1946-47 season. The considerable increase of nearly 67,000 acres of "wet" padi was spread over all States and Settlements, and the main increases were as follows: Kedah 21,000, Perak 13,500, Perlis 5,400, Pahang 4,500 Kelantan 4,400 and Selangor 4,000.

In addition to the main crop in the 1947-48 season, there were 3,578 acres of "wet" padi and 602 acres of "dry" padi, a total of 4,180 acres, planted as an off-season crop. Although before the war experiments in off-season padi cultivation had been carried out by the Department of Agriculture, the post-war development of this crop is largely the result of the occupation period when the urgent need for additional sources of food acted as a stimulus to the planting of a second short-term padi crop. Statistics for this second crop were recorded separately for the first time for the past season.

Table 1.
Area of Land Planted and Harvested, and Yields of Padi. Season 1947-1948.

State/ Settlement	WET				DRY				TOTAL WET AND DRY PADI		
	Area Planted. acres	Area Harvested. acres	Yield (gantangs) (000's)	Average Yield (gantangs per acre)	Area Planted. acres	Area Harvested. acres	Yield (gantangs) (000's)	Average Yield (gantangs per acre)	Area Planted. acres	Area Harvested. acres	Yield (gantangs) (000's)
Perlis ..	42,010	38,055	12,788	303	37	37	5	141	42,047	38,092	12,793
Kedah ..	257,890	253,691	80,892	314	5,980	5,980	512	86	263,870	259,671	81,404
Kelantan ..	138,196	134,240	34,891	260	29,994	29,994	4,571	152	168,100	164,234	39,462
Trengganu ..	38,480	37,734	6,477	172	15,406	14,096	1,527	108	53,886	51,830	8,004
Penang & P. Wellesley..	39,584	39,507	12,951	328	2,539	2,266	214	94	42,123	41,773	13,165
Perak ..	119,664	111,290	28,648	257	18,097	18,030	1,927	107	137,761	129,320	30,575
Selangor ..	38,453	34,920	7,699	220	5,630	5,100	430	84	44,083	40,020	8,129
Pahang ..	44,266	32,624	6,694	205	2,405	2,405	173	72	46,671	35,029	6,867
N. Sembilan ..	33,283	33,034	9,432	286	49	49	2	31	33,332	33,083	9,434
Malacca ..	32,357	32,357	5,031	155	85	85	12	136	32,442	32,442	5,043
Johore ..	15,058	13,958	2,002	143	1,931	1,700	139	82	16,989	15,658	2,141
Total ..	799,151	761,410	207,505	273	82,153	79,742	9,512	119	881,304	841,152	217,017
Off-Season Crop	3,578	3,578	818	229	602	138	11	76	4,180	3,716	829
Total 1947-1948	802,729	764,988	208,323	272	82,755	79,880	9,523	119	885,484	844,868	217,846
Total 1946-1947	732,614	—	162,376	222	80,924	—	8,896	110	813,538	—	171,272

Notes:—1. Yield to the nearest 1,000 gantangs.
2. For 1946-47 separate figures for acreages harvested were not recorded.

For the first time also, additional statistics are now available of the area actually harvested as distinct from the area originally planted. Of the total planted area of 885,484 acres (including the off-season crop), 844,868 acres were harvested; thus there was a total crop failure on over 40,000 acres, representing a loss of approximately 17,000 tons of rice. This serious loss was due to bad weather conditions during the season. Serious floods occurred along the East Coast in Kelantan, Pahang, and Johore, principally as the crop was in the flowering stage, and lesser floods occurred in Perak and Province Wellesley.

Drought conditions in Kedah as the grain was ripening lightened the final yield of a very promising crop, and drought at the beginning of the season both in Trengganu and in the important new padi area along the north coast of Selangor very seriously affected the padi crops there.

Table I gives a summary of acreages and yields for the 1947-48 season, together with comparative figures for the previous season, and Table II gives details of the off-season crop.

In calculating the yield of milled rice, a conversion factor of 635 gantangs padi = 1 ton rice has been used, representing a rice recovery of 63 per cent. by weight from freshly harvested padi. Formerly a conversion factor of 666 gantangs was used, equal to a recovery of only 60 per cent. In order to obtain the necessary licence to operate, rice mills have now to mill to a minimum 63 per cent. recovery on padi delivered at the mill, and this represents an actual milling recovery of 66 or 67 per cent. To ensure this higher percentage they are encouraged to under-mill, i.e. to produce a less highly-milled rice.

The 1947-48 rice production of 343,065 tons shows a rapid recovery to pre-war production and compares with 257,164 tons in the 1946-47 season. The increase of approximately 86,000 tons is made up as follows:—

	Tons.
Increase due to higher estimation of milling recovery	16,000
„ „ larger acreage	14,000
„ „ higher yield	56,000
Total increase ..	86,000

From the above figures it will be seen that 65 per cent. of the increase is due to the higher average yield obtained. Last season's average padi production of 272 gantangs per acre is 22.5 per cent. higher than the yield of 222 for 1946-47. This is a very substantial improvement in yield.

In the 1946-47 season, however, in Kedah, the most important padi-growing State in the Peninsula, yields were the lowest on record owing to heavy rains and floods occurring at harvest. These heavy rains also seriously affected the crop in Perak, Province Wellesley, Kelantan and Trengganu. Furthermore, no distinction was made between planted and

Table III.

Area of Land Planted in Malaya, Yields of Padi, and Rice Production.

Season	WET PADI				DRY PADI				TOTAL		
	Planted Area acres	Yield of Padi gantangs (000's)	Average Yield per acre		Yield of Padi gantangs (000's)	Planted Area acres	Rice Production tons	Yield of Padi gantangs (000's)	Planted Area acres	Rice Production tons	Yield of Padi gantangs (000's)
			Padi gantangs	Rice lbs.							
1921-22	589,461	—	—	—	—	54,728	—	—	644,189	—	211,302
1922-23	555,675	—	—	—	—	101,702	—	—	657,377	—	234,849
1923-24	561,389	—	—	—	—	90,541	—	—	651,930	—	233,952
1924-25	565,691	—	—	—	—	90,386	—	—	656,077	—	238,941
1925-26	571,516	113,438	198	666	170,328	82,385	170,328	—	653,901	123,494	185,427
1926-27	571,188	118,023	207	696	177,211	78,502	177,211	—	649,690	126,966	190,639
1927-28	631,301	130,813	207	696	196,416	31,769	196,416	—	663,070	135,025	202,741
1928-29	650,941	121,197	186	626	181,977	36,123	181,977	—	687,064	126,229	189,533
1929-30	629,648	103,624	165	555	155,590	27,550	155,590	—	657,198	106,784	160,335
1930-31	603,070	166,845	277	932	250,504	104,670	250,504	—	707,740	175,967	264,202
1931-32	635,130	184,631	291	977	277,221	89,850	277,221	—	724,980	197,103	295,948
1932-33	674,920	186,345	276	928	279,786	91,990	279,786	—	766,910	199,761	299,921
1933-34	691,110	215,098	311	1,046	322,971	74,140	322,971	—	765,250	224,487	337,068
1934-35	669,290	213,835	319	1,073	322,971	65,440	322,971	—	734,730	220,555	331,164
1935-36	674,900	219,786	325	1,093	330,012	50,150	330,012	—	725,050	227,873	342,150
1936-37	693,550	206,256	297	1,000	309,693	46,490	309,693	—	740,040	212,610	319,234
1937-38	681,410	193,124	283	952	289,976	44,550	289,976	—	725,960	199,144	299,015
1938-39	700,270	217,290	310	1,043	326,261	46,450	326,261	—	746,720	225,395	338,431
1939-40	721,580	210,077	291	979	315,431	63,870	315,431	—	785,450	220,670	331,336
1940-41	742,600	204,473	275	925	307,016	77,880	307,016	—	820,480	215,924	324,210
1945-46	684,010	143,303	210	906	215,170	105,640	215,170	—	789,650	149,880	225,044
1946-47	732,620	162,376	222	947	243,808	80,930	243,808	—	813,550	171,272	257,164
†1947-48	802,730	208,323	272*	959*	328,068	82,760	328,068	—	885,490	217,846	343,065

* Calculated on acreage harvested.

† Including off-season crop.

Acreage to the nearest 10 acres.

Rice production estimated on a basis of 635 gantangs of padi = 1 ton of rice for season 1947-48, and at 666 gantangs for previous seasons.

harvested acreages in some returns, and it is almost certain that the total planted acreage was not harvested and that areas damaged by floods or drought would show a very low yield.

Table III provides a summary of rice production in Malaya since the 1921-22 season, showing acreages under "wet" and "dry" padi, yields of padi in gantangs per acre, yields of rice in pounds per acre, and total rice production. Statistics for Labuan and Brunei have been excluded from pre-war figures in order to provide a more accurate comparison with returns for the present Federation of Malaya. As explained earlier, rice production up to 1947-48 was calculated on a basis of 666 gantangs of padi = 1 ton of rice, and it will be seen that, although the past season's recorded estimation of rice production constituted a record, the actual yield of padi has been exceeded in earlier years.

Rice production since the war has increased steadily from 225,044 tons in 1945-46 to 257,164 tons in 1946-47 and now to the record total of 343,065 tons. Average yields of "wet" padi per acre have also steadily improved: 1945-46 210 gantangs; 1946-47 222 gantangs; 1947-48 272 gantangs. The latest average yield is only slightly below that of 275 gantangs for the 1940-41 season, but is not up to the standard of 310 gantangs for the 1938-39 season.

The acreage under "wet" padi has increased since the war by 115,000 acres, and by 57,000 acres in comparison even with the 1940-41 season, the previous highest total. A considerable portion of this increase is due to the drive for increased rice production and also to the high price to be obtained for rice in the "free market." It is probable that much land has been brought into cultivation that in pre-war seasons was not considered worth planting with padi, but which, with improved irrigation facilities, can now produce a fair average yield.

Since the liberation, conditions have been improved on approximately 120,000 acres by the Drainage and Irrigation Department in conjunction with officers of the Department of Agriculture, bringing back established padi land to its pre-war condition, and enabling higher yields to be obtained.

Tables IV and V show the distribution of "wet" and "dry" padi land throughout the Federation of Malaya. Approximately a third of the total acreage is in the State of Kedah, while Kelantan and Perak are next in importance with 17 and 15 per cent. respectively.

Table VI provides a comparison of "wet" padi acreages in post-war years with the 1940-41 season by States and Settlements. The acreage in Kedah is still slightly less than pre-war, but all other States, with the exception of Perlis, show an increase, notably Selangor, Johore and Pahang.

Table VII provides a comparison for the same periods, also by States and Settlements, of gross yields of padi and of average yields per acre. It will be seen that Kedah is still far short of the high 1940-41 average yield of 380 gantangs per acre, and similarly Malacca is well below a pre-war

Table IV.
Distribution of " Wet " Padi Land.
(in acres)

State/ Settlement	1940-41		1945-46		1946-47		1947-48	
	Planted Area	Per cent.	Planted Area	Per cent.	Planted Area	Per cent.	Planted Area	Per cent.
Perlis ..	42,010	5.7	35,710	5.2	36,640	5.0	42,010	5.3
Kedah ..	265,460	35.7	213,830	31.3	236,820	32.3	257,890	32.3
Kelantan ..	133,290	17.9	119,530	17.5	133,730	18.3	138,110	17.3
Trengganu ..	33,580	4.5	26,680	3.9	34,880	4.8	38,480	4.8
Penang & P. Wellesley	36,890	5.0	36,490	5.3	37,740	5.1	39,580	4.9
Perak ..	103,630	14.0	100,730	14.7	106,140	14.5	119,660	15.0
Selangor ..	22,600	3.0	33,720	4.9	34,520	4.7	38,450	4.8
Pahang ..	32,390	4.4	42,740	6.3	39,790	5.4	44,270	5.5
N. Sembilan ..	32,700	4.4	27,690	4.0	29,610	4.0	33,280	4.2
Malacca ..	29,450	4.0	30,600	4.5	30,610	4.2	32,360	4.0
Johore ..	10,600	1.4	16,290	2.4	12,140	1.7	15,060	1.9
Total ..	742,600	100.0	684,010	100.0	732,620	100.0	799,150	100.0

Acreage to the nearest 10 acres.

Table V.
Distribution of " Dry " Padi Land.
(in acres)

State/ Settlement	1940-41		1945-46		1946-47		1947-48	
	Planted Area	Per cent.	Planted Area	Per cent.	Planted Area	Per cent.	Planted Area	Per cent.
Perlis ..	—	—	200	0.2	60	0.1	40	0.1
Kedah ..	3,180	4.1	5,320	5.0	4,260	5.3	5,980	7.3
Kelantan ..	46,910	60.2	29,780	28.2	29,890	36.9	29,990	36.5
Trengganu ..	16,880	21.7	11,720	11.1	18,180	22.5	15,410	18.8
Penang & P. Wellesley	80	0.1	—	—	590	0.7	2,540	3.1
Perak ..	6,450	8.3	33,550	31.8	15,040	18.6	18,100	22.0
Selangor ..	720	0.9	4,790	4.5	4,890	6.0	5,630	6.8
Pahang ..	1,810	2.3	5,130	4.9	4,410	5.4	2,410	2.9
N. Sembilan ..	—	—	950	0.9	40	0.1	50	0.1
Malacca ..	—	—	—	—	120	0.1	90	0.1
Johore ..	1,850	2.4	14,200	13.4	3,450	4.3	1,930	2.3
Total ..	77,880	100.0	105,640	100.0	80,930	100.0	82,170	100.0

Acreage to the nearest 10 acres.

Table VI.

**Comparison of Post War Planted Acreages of "Wet" Padi with
1940-41 Season.**

(by States and Settlements)

State/ Settlement	1940-41	1945-46		1946-47		1947-48	
	Planted Area acres	Planted Area acres	Increase or Decrease Per cent	Planted Area acres	Increase or Decrease Per cent	Planted Area acres	Increase or Decrease Per cent
Perlis ..	42,010	35,710	- 15.0	36,640	- 12.8	42,010	—
Kedah ..	265,460	213,830	- 19.4	236,820	- 10.8	257,890	- 2.9
Kelantan ..	133,290	119,530	- 10.3	133,730	+ .3	138,110	+ 3.6
Trengganu ..	33,580	26,680	- 20.5	34,880	+ 3.9	38,480	+ 14.6
Penang & P. Wellesley	36,890	36,490	- 1.1	37,740	+ 2.3	39,580	+ 7.3
Perak ..	103,630	100,730	- 2.8	106,140	+ 2.4	119,660	+ 15.5
Selangor ..	22,600	33,720	+ 49.2	34,520	+ 8.5	38,450	+ 70.1
Pahang ..	32,390	42,740	+ 32.0	39,790	+ 22.8	44,270	+ 36.7
N. Sembilan ..	32,700	27,690	- 15.3	29,610	- 9.4	33,280	+ 1.8
Malacca ..	29,450	30,600	+ 3.9	30,610	+ 3.9	32,360	+ 9.9
Johore ..	10,600	16,290	+ 53.7	12,140	+ 14.5	15,060	+ 42.1
Total ..	742,600	684,010	- 7.9	732,620	- 1.3	799,150	+ 7.6

Acreage to the nearest 10 acres.

yield of 267 gantangs. Johore, Pahang and Perak show substantial increases in average yields.

Table VIII shows Malayan rice production in relation to imports and consumption. Unfortunately, owing to the incomplete import figures for 1941, and to the reduced imports since the war, no useful comparison can be made with pre-war years when local production was approximately a third of total consumption (as estimated by the sum of local production and net imports). Complete figures for 1948 imports are not yet available, but on a basis of 425,000 tons net imports, local production would represent 45 per cent. of total consumption, and 81 per cent. of imports. It must be emphasized, however, that present total consumption is abnormally low; imports are restricted and only a low ration of rice is possible: thus, local production would represent a much smaller percentage of potential total consumption.

Imports and Exports.

Supplies of rice since the war have been considerably restricted, and all allocations and shipments of available world supplies have been under the control of I.E.F.C. (the International Emergency Food Committee of the Food and Agriculture Organization).

Table VII.
Comparison of Post War Cross and Average Yields of "Wet" Padi with 1940-41 Season.
 (by States and Settlements)

State/ Settlement (1)	1940-41		1945-46			1946-47			1947-48		
	Yield gantangs (2)	Average Yield per acre gtgs. (3)	Yield gantangs (4)	Aver. Yield per acre gtgs. (5)	Incr. or Decr. (4) to (2) per cent. (6)	Yield gantangs (7)	Aver. Yield per acre gtgs. (8)	Incr. or Decr. (7) to (2) per cent. (9)	Yield gantangs (10)	Aver. Yield per acre gtgs. (11)	Incr. or Decr. (10) to (2) per cent. (12)
Perlis	12,904,000	307	7,532,000	211	- 41.6	10,320,000	281	- 20.0	12,788,000	303	- 9
Kedah	100,852,000	380	62,954,000	294	- 37.6	61,820,000	261	- 38.8	80,892,000	314	- 19.8
Kelantan	33,491,000	251	19,897,000	166	- 40.6	29,636,000	222	- 11.7	34,891,000	260	+ 4.2
Trengganu	4,773,000	142	4,224,000	158	- 11.6	5,636,000	161	+ 18.1	6,477,000	172	+ 35.7
Penang & P. Wellesley	9,781,000	265	8,064,000	221	- 17.6	8,840,000	234	- 9.6	12,951,000	328	+ 32.4
Perak	17,488,000	169	18,099,000	180	+ 3.5	17,753,000	167	+ 1.5	28,648,000	257	+ 63.8
Selangor	4,876,000	216	7,570,000	224	+ 55.3	8,683,000	252	+ 78.1	7,699,000	220	+ 57.9
Pahang	3,833,000	118	5,739,000	134	+ 49.7	7,225,000	182	+ 88.5	6,694,000	205	+ 74.6
N. Sembilan	7,718,000	236	3,106,000	112	- 59.8	5,808,000	196	- 24.7	9,432,000	286	+ 22.2
Malacca	7,869,000	267	4,984,000	163	- 36.7	5,689,000	186	- 27.7	5,031,000	155	- 36.1
Johore	888,000	84	1,134,000	70	+ 28.9	967,000	80	+ 10.0	2,002,000	143	+ 127.5
Total	204,473,000	275	143,303,000	210	- 29.9	162,377,000	222	- 20.6	207,505,000	273	+ 1.5

Notes. Yield to the nearest, 1,000 gantangs.

To be read in conjunction with Table VI which shows corresponding planted acreages.

Table VIII.
Malayan Production of Rice in Relation to Net Imports
and Consumption 1936-1947.

	1936	1937	1938	1939	1940	1941	1946	1947
Net imports (tons) ..	533,795	319,234	612,394	658,653	635,360	538,995*	136,434	237,119
Production (tons) ..	342,150	573,063	299,190	341,455	335,138	324,210	225,044	257,164
Consumption (tons) ..	875,945	892,297	911,584	1,000,108	970,498	863,205	361,478	494,283
Percentage of production to net imports ..	64	56	49	52	53	60	165	108
Percentage of production to consumption	39	36	33	34	35	38	62	52

* Jan.-Oct. (inclusive).

Annual Malayan imports and exports of rice are given in Table IX; this table includes broken rice but does not include rice bran and meal and padi. Of the total gross imports of 238,705 tons in 1947, 111,586 tons (46.8 per cent.) were from Burma, 95,622 tons (40.0 per cent.) from Siam, 17,580 tons (7.4 per cent.) from Brazil and 13,917 tons (5.8 per cent.) from other countries. From Indo-China only 120 tons of broken rice were imported.

Table IX.
Malayan Imports and Exports of Rice.
 Excluding Rice Bran and Meal and Padi.

Year	Imports		Exports		Net Imports	
	Tons	Value \$	Tons	Value \$	Tons	Value \$
1929 ..	785,558	95,461,036	233,897	28,031,407	551,661	67,429,629
1930 ..	800,443	87,666,723	208,688	23,361,561	591,755	64,305,162
1931 ..	691,112	48,458,102	175,385	13,453,189	515,727	35,004,913
1932 ..	592,209	39,632,925	183,209	12,660,493	409,000	26,972,432
1933 ..	592,912	33,846,158	159,746	9,493,291	433,166	24,352,867
1934 ..	619,199	32,813,558	165,968	8,609,566	453,231	24,203,992
1935 ..	655,845	40,114,794	184,463	11,060,993	471,382	29,053,801
1936 ..	715,632	43,053,805	181,837	10,846,378	533,795	32,207,427
1937 ..	711,581	47,800,364	138,518	9,589,376	573,063	38,210,988
1938 ..	814,870	53,822,372	202,476	13,389,308	612,394	40,433,064
1939 ..	824,126	51,931,238	165,473	10,230,494	658,653	41,700,744
1940 ..	770,481	61,366,133	135,121	10,469,983	635,360	50,896,150
1941* ..	625,522	68,685,273	86,507	10,479,131	538,995	58,206,142
1946 ..	138,377	24,780,222	1,944	249,266	136,433	24,530,956
1947 ..	238,705	57,767,314	1,586	316,603	237,119	57,451,711

* Jan.-Oct. (inclusive).

The different grades of rice imported during 1947 were as follows (net imports only are given): white rice 231,095 tons, parboiled rice 5,921 tons, cargo rice (net export) 1 ton, and broken rice 104 tons.

The following are post-war imports of padi into Malaya: 1946 347 tons, value \$34,665; 1947 11 tons, value \$3,068; 1948 (Jan.-Sept.) 510 tons, value \$71,679. In 1946 there was an export of 1 ton, value \$500.

Prices and Rationing.

Both prices and sale of rice have been under Government control since the war. The Supplies Department is responsible for the importation, storage, control and distribution of rice, and also for the purchase of padi and taking delivery of the milled rice.

Wholesale and controlled retail prices are shown in Table X, which gives also an indication of free (black) market prices ruling as far as they could be ascertained. The average retail price of rice in Singapore in 1940 was 33 cents per gantang. The 1940 average wholesale prices of rice per picul were as follows: Siam No. 2 (Ordinary) \$4.93, Rangoon No. 1 \$5.05, Saigon No. 1 (Long Grain) \$4.85.

Table X.
Average Prices of Rice in Malaya in 1948.

1948	Controlled Price of Rationed Rice per kati	Free Market (Average retail price for Federation)		Average Singapore Wholesale Price of Free Rice per picul
		Siam per kati	Local per kati	
January ..	\$.25	\$.84	\$.59	97.24
February ..	.30	.80	.58	80.88
March ..	.30	.72	.50	71.04
April ..	.30	.62	.45	66.15
May ..	.30	.59	.42	65.00
June ..	.30	.58	.41	64.36
July ..	.30	.57	.40	63.83
August ..	.30	.51	.39	60.00
September ..	.30	.49	.36	60.00
October ..	.30	.48	.36	60.38
November ..	.30	.51	.39	64.00
December ..	.30	.50	.38	59.24
Average 1948 ..	.30	.60	.44	67.68
Average 1947 ..	.24	.82	.60	108.00

Note.—Singapore wholesale prices are as quoted in the "Straits Times", and are for "Unclassified No. 1 Rice" for 1948, and for "Siam No. 1", for 1947. Federation "free market" retail prices are the averages of returns from markets throughout the Peninsula.

The average declared trade value of imports of rice during 1946 was \$10.66 per picul, and \$14.40 in 1947 as compared with \$3.75 in 1939, \$4.74 in 1940, and \$6.54 in 1941 (Jan.-Oct. imports). The declared trade value of imports of rice for the period January to September, 1948, was \$24.26 per picul.

Table XI shows the rice ration scales in force in the Federation and in Singapore since 1946.

Table XI.
Rice Ration Scales.

FEDERATION OF MALAYA.

Period	Male katis per week	Female katis per week	Child katis per week
1. 1.46—19. 5.46 ..	2	1	1
20. 5.46—18. 8.46 ..	1½	1	¾
19. 8.46—22.12.46 ..	¾ kati per person		
23.12.46— 2. 2.47 ..	1½	" "	" "
3. 2.47—18. 5.47 ..	2	" "	" "
19. 5.47—25. 1.48 ..	1½	" "	" "
26. 1.48— 1. 2.48 ..	1½	" "	" "
2. 2.48—30. 5.48 ..	2	" "	" "
31. 5.48— 1. 8.48 ..	2½	" "	" "
2. 8.48—30.10.48 ..	3*	" "	" "
1.11.48 ——— ..	2½	" "	" "

SINGAPORE.

1. 1.46—19. 5.46 ..	3	2½	1½
20. 5.46—18. 8.46 ..	2½	1½	¾
19. 5.46— 9. 2.47 ..	1½	1	¾
10. 2.47—18. 5.47 ..	2½	2	1½
19. 5.47— 1. 2.48 ..	2½	1½	¾
2. 2.48—30. 5.48 ..	2½	2	1½
31. 5.48 ——— ..	3½	2½	2½

* Including ½ kati bonus.

Note.—In addition to the above rations, extra rations at varying rates have been granted to heavy workers.

Immediately after the war Government instituted guaranteed prices for locally produced padi, and details of these are given in Table XII.

Table XII.
Guaranteed Prices paid by Government for Padi.
(in dollars per picul)

Date	Ex-field	Delivered Mill
	\$	\$
1945-46 ..	3.60	4.40
8 July, 1946 ..	5.20	6.00
6 November, 1946 ..	9.20	10.00
1 January, 1947 ..	19.20	20.00
1 July, 1948 ..	14.20	15.00

The guaranteed price for padi at the Government Rice Mill, Perak, in 1940 was \$2.50 per picul. This price was fixed for a period of three years from 1st January, 1940. A guaranteed minimum price of \$2 per picul for padi was fixed by the Government of Kedah for 1940.

In 1947 padi buyers were licensed by the Supplies Department in consultation with Resident Commissioners, and they received a bonus of \$2 for every 10 piculs of padi bought. This bonus was continued in 1948.

Of the 1945-46 season crop Government purchased 403,532 piculs of padi equivalent to approximately 14,000 tons of rice. From the 1946-47 crop purchases increased to 1,469,000 piculs of padi, equivalent to 53,100 tons of rice, and from the past season purchases totalled 2,395,425 piculs of padi, equivalent to 89,825 tons of rice.

Rice Mills.

All rice mills are required by law to register, but only mills which are licensed are allowed to operate, and they do so under contract with the Supplies Department. Mills are licensed by State/Settlement Governments.

In 1947 133 mills were licensed and they were required to operate to a 60 per cent. rice recovery. In 1948 248 mills were registered, but only 96 mills were licensed, and, as explained earlier, the minimum milling recovery was increased to 63 per cent. A milling charge of \$2.90 per picul of rice was paid, plus a bonus of 10 cents for every bag (approximately 168 kati net) of good whole rice containing not more than 5 per cent. broken rice.

For the 1948-49 season the Supplies Department is entering into new contracts with all licensed mills whereby Government purchases only rice from the mills at \$25.75 per picul ex mill, and the mills are responsible for the purchase of padi. All padi buyers will therefore be linked with the mills, and Government will no longer pay the buyer's bonus mentioned above. The price of padi guaranteed by Government will continue unchanged at \$15 per picul at mill door or \$14.20 in the field until 30th June 1949,

but these prices may, of course, be exceeded if mills wish and find it profitable to do so. To control transport charges fixed rates will be arranged with millers for the delivery of rice to Government stores.

The above changes in procedure will considerably simplify the purchase of rice by Government, and will eliminate much accounting in connexion with the purchase of padi, buyer's bonus, transport charges, and loss in weight. Under the new arrangements millers will provide their own gunny bags which previously were supplied by the Supplies Department.

Prospects for the 1948-49 Season.

The total acreage to be planted with "wet" and "dry" padi should be approximately 925,000 acres, excluding the off-season crop, an increase of over 40,000 acres. The estimated increase in "wet" padi is nearly 60,000 acres, but there is a decrease in the "dry" padi areas, though it is probable that the latter will increase as the season progresses.

It had been expected that the 1948-49 season would set a further record for Malayan rice production, but the abnormal and long extended drought experienced in December and January has seriously affected the large padi districts in the north of the Peninsula, particularly in Kedah and Province Wellesley. The effect on the total yield cannot yet be assessed, but it is probable that the total Kedah crop may be reduced by 20 to 30 per cent. which would mean a reduction of 25,000 to 40,000 tons of rice. Thus, after allowing for the larger crop to be obtained from the increased acreage, it is doubtful if total rice production will exceed 330,000 tons.

ECOLOGICAL OBSERVATIONS ON *AXONOPUS* SPP. AND OTHER GRASSES IN MALAYA

BY

R. B. JAGOE,

Senior Botanist.

In 1940, while making a systematic study of *Axonopus compressus*, the broad-leaved Savannah grass, and *Axonopus affinis*, the narrow-leaved Carpet grass, it was observed that both grew better under medium shade than in similar soil exposed to full sunlight.

It was also observed that *Axonopus compressus*, when growing in the hotter, drier conditions of exposure to full sunlight, appeared to be more adversely affected than *Axonopus affinis*, which seemed the hardier in such circumstances, but in a cool situation under medium shade *Axonopus compressus* appeared to have the greater vigour.

It was decided that these impressions should be tested by extended observations, and suitable and convenient sites in the neighbourhood of the Department of Agriculture, Kuala Lumpur, were examined and "mapped" for this purpose in October 1941.

The war intervened, but fortunately the records for several of these plots have survived, and examination of these sites in 1947-48 has proved interesting.

All the grass plots concerned in these observations were at different dates artificially levelled and planted with sods and sets of *Axonopus* spp.

Up till 1941 they were regularly scythed approximately every 6 weeks, but during the Japanese occupation they were cut only very occasionally.

Plot No. I. This plot, 50 ft. x 20 ft., on a hill-side, with very good drainage, under shade of two large leguminous trees *Enterolobium saman* and *Enterolobium cyclocarpum* only 42 ft. apart, was composed predominantly of *Axonopus compressus* with three large conjoint patches of *Axonopus affinis*, and six small patches of *Ischaemum timorense*. The plot was planted about 1931.

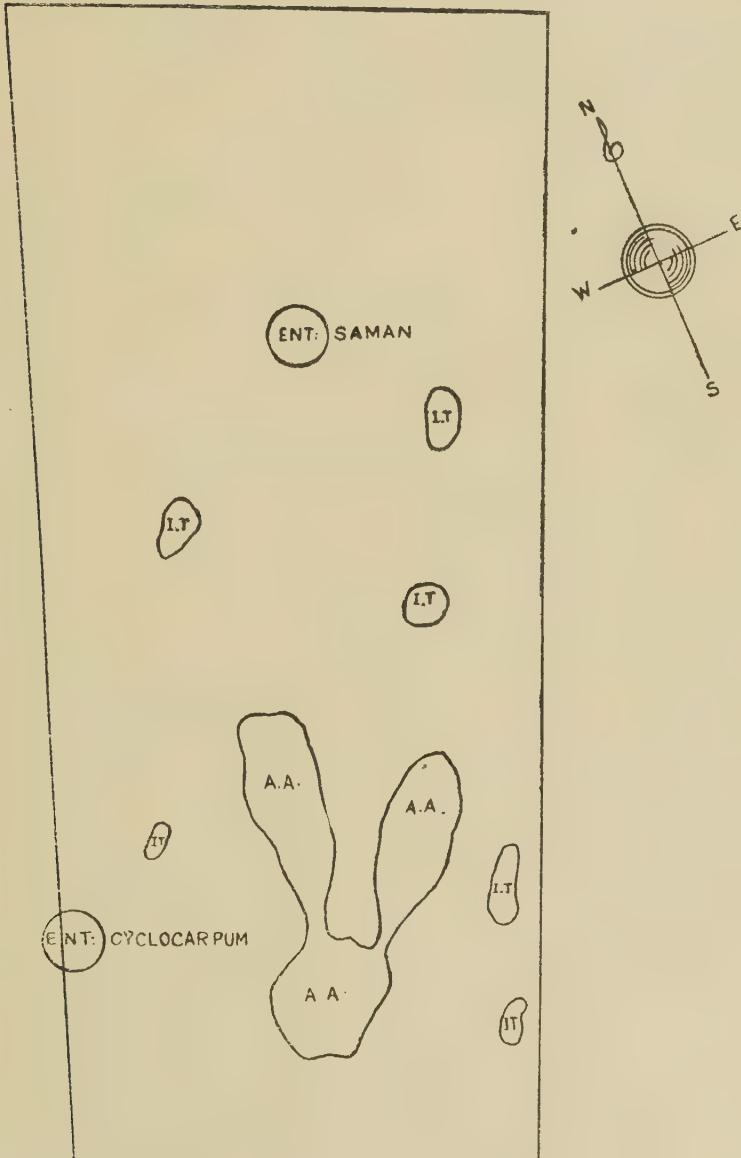
The two trees are rather close together, but there are, as yet, no other large trees close to the plot, and although the immediate overhead shade is more than medium, there has been no heavy shading on account of good side lighting from the south.

In 1947 there was no trace of *Axonopus affinis*, and it had apparently been suppressed by the dominant *Axonopus compressus*. The small patches of *Ischaemum* had also disappeared.

Plot II. A small plot under shade of an *Enterolobium saman* in 1941 was composed, in approximately equal density, of both *Axonopus compressus* and *Axonopus affinis*. In 1947 there was only one species, *Axonopus compressus*, as in Plot I.

Plot I, 1941.

Axonopus compressus, with 3 Conjoint Patches of *Axonopus affinis* and
6 Small Patches of *Ischaemum timorense*.

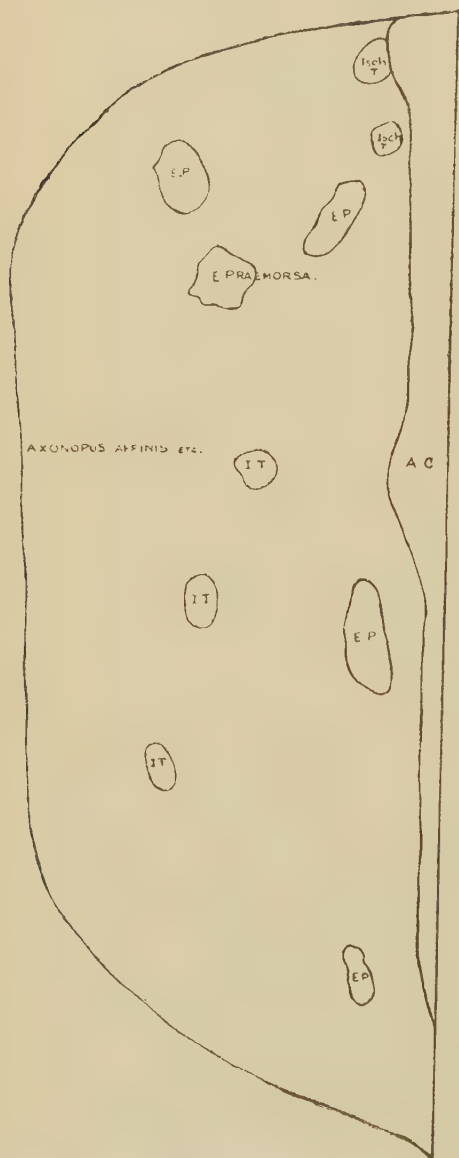


Plot I, 1948.

Pure Cover of *Axonopus compressus* with Suppression of Other Grasses.

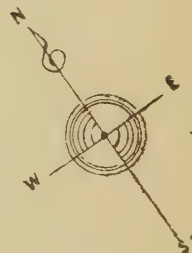
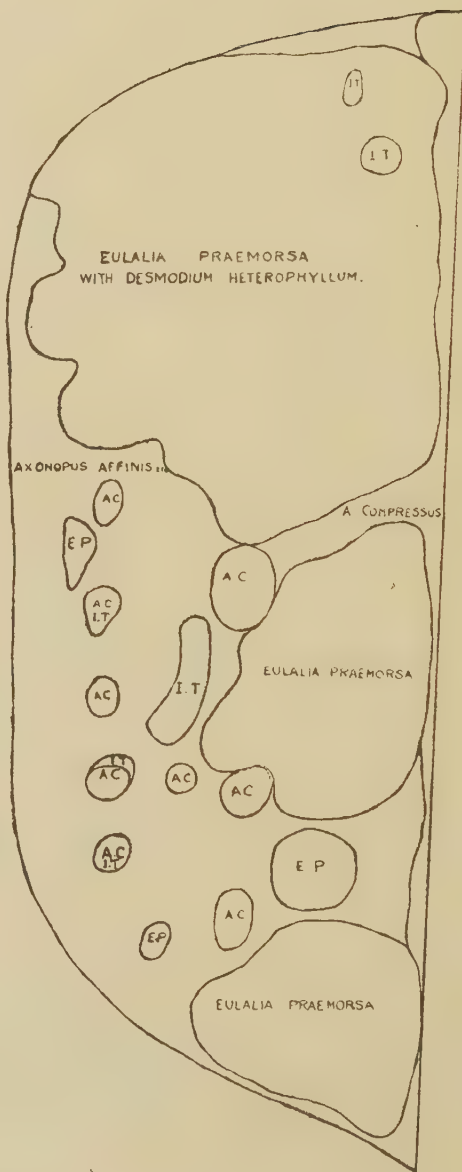
Plot IV, 1941.

Axonopus affinis with *Desmodium heterophyllum* (Sparse Growth of *Chrysopogon aciculatus* and few Plants of *Axonopus compressus* included) 5 Medium Patches of *Eulalia praemorsa* 5 Small Patches of *Ischaemum timorense*.



Plot IV, 1948.

Extensive Growth of *Eulalia* *praemorsa* and Restricted Growth of *Axonopus affinis*



Plot III. A similar small plot of *Axonopus compressus* with two small patches of *Ischaemum timorense* has remained unaltered.

Plot IV. This plot is unshaded, and was planted in 1939 with *Axonopus affinis*. A bank on one side separated it from Plots II and III, and this was covered with *Axonopus compressus* which tended to invade the south-eastern border of Plot IV.

In 1941 this plot was composed predominantly of an association of *Axonopus affinis* and a clover-like legume, *Desmodium heterophyllum*. *Chrysopogon aciculatus* was sparse throughout; *Eulalia praemorsa* occurred in five medium-sized patches averaging 2 sq. ft., with *Ischaemum timorense* in five smaller patches, and single plants only of *Digitaria longiflora* and *Brachiaria distachya*.

In 1947 a quite unanticipated condition was found, for about 65 per cent. of the plot had been covered by *Eulalia praemorsa*. This had superseded *Axonopus affinis* as the dominant grass, but *Desmodium heterophyllum* had persisted unaltered.

The *Axonopus affinis* remains now (1948) in a variable and relatively narrow strip along the western side of the plot, and may, presumably, be ousted altogether by the *Eulalia* in the course of another two or three years. *Chrysopogon* is sparse in this area also. The small patches of *Ischaemum timorense* still exist, though perhaps slightly reduced in size.

The *Axonopus compressus* "invading" from the south-east side has been pushed back a little by the *Eulalia*, but has appeared in two old planting holes and in several other shallow depressions.

The observations intended here, as to whether *Axonopus compressus* could further invade the unshaded plot of *Axonopus affinis* were completely negatived by the vigorous growth of the *Eulalia praemorsa* which was able to suppress all other grass species, with the possible exception of the *Ischaemum timorense*, which is of a similar loose stoloniferous habit of growth.

It is intended that suitable leguminous shade trees should now be planted in Plot IV to study the possibilities of the recovery of the *Axonopus* spp. in such improved conditions.

Nutrient Status of Soil.

It may be mentioned here that the coarse grasses known as "Rumput Jenaras" predominant on grazing-land in Kelantan where malnutrition of cattle has occurred, have been identified as *Ischaemum* and *Eulalia* spp., and the occurrence of these grass species may be regarded as indicative of a general low nutrient status of the soil.

It was presumed, too, that the heavily noduled roots of the leguminous Rain trees might contribute additional nitrogen to the soil of their environment.

It was necessary, however, to make some precise comparative examination of the soil conditions pertaining to the present experiment, and the Ag. Senior Soils Chemist (Dr. S. G. Willimott) kindly undertook analyses of a brief series of samples of soil taken under grass in the opposed conditions of shade and no shade. The results are shown in Table I.

Table I.
Analyses of Soil Samples under Poor and Good Growth of Grass.

Soil Ref. No.	Situation	Depth		pH Potential	On Oven-dry Basis		
					Organic Carbon	Nitrogen	N/C Ratio
		ft.	ins.		per cent.	per cent.	
R. 6737	Under poor grass under unshaded Plot IV.	0	3	7.5	1.47	0.1204	1 : 12
6739		0	3	6.7			
6741		0	3	6.4			
6738	-do-	0	3	6.1	0.93	0.0868	1 : 11
6740		0	3	6.2			
6742		0	3	6.4			
6743	Under poor grass under shade Plot II.	0	3	6.0	1.50	0.1484	1 : 10
6745		0	3	6.7			
6747		0	3	6.5			
6744	-do-	0	3	5.3	0.91	0.0980	1 : 9
6746		0	3	6.2			
6748		0	3	5.3			

From these data it appears that there is no significant difference in the levels of soil fertility under good growth of grass under shade where *Axonopus compressus* predominated, and under poor growth of grass without shade where *Eulalia praemorsa* spread successfully.

It would seem therefore that the more vigorous growth of *Axonopus compressus* is not due to improved soil fertility, but must be due, at least primarily, to beneficial effects of shade, presumably, in particular, lower soil and air temperatures, and possibly also higher moisture content of the soil and higher relative humidity.

Observations with regard to these factors will be made the subject of a subsequent investigation.

Summary.

Observations in 1941 and 1947-48 have shown that the pasture or coarse lawn grass *Axonopus compressus* may suppress and supersede *Axonopus*

affinis when growing in the medium shade of the large leguminous trees, *Enterolobium saman* and *Enterolobium cyclocarpum*.

Further observation has shown that *Eulalia praemorsa*, in an unshaded firm soil, can, with its crowded, loose, stoloniferous habit, smother and suppress the common grasses *Axonopus affinis*, *Chrysopogon aciculatus* and probably also *Axonopus compressus*. It might be regarded as an undesirable pest of lawns, and possibly also of pasture land.

Plans of two of these plots more clearly illustrate the results of some of these observations.

It seems apparent that the governing ecological factor is not, in these instances, one of soil fertility, but probably is concerned with the more favourable soil temperature and possibly also moisture content preserved by shade of suitable trees which do not reduce too greatly the intensity of sunlight.

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“BLISTER BLIGHT” OF TEA

BY

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Senior Plant Pathologist.

In Malaya the tea plant (*Camellia Thea*) is affected by a number of leaf diseases due to the attack of fungi, but, fortunately, these diseases are of relatively minor importance in that, normally, only the older leaves are attacked, and, usually, the area of leaf surface involved is not extensive.

The most serious leaf disease affecting tea has not yet appeared in Malaya. This disease, “Blister Blight,” was first recorded in India, in Assam about 1858, and in Darjeeling in 1908, and is reported to occur in Japan and parts of Indo-China. In August, 1946, it occurred for the first time in South India and by October of that year appeared in Ceylon, probably as a result of the increased development of air transport, but whereas tea estates do not appear to have suffered widespread damage in Assam and Darjeeling, it is at present causing concern in South India and Ceylon on highland estates where climatic conditions appear to be suitable for its rapid extension and to influence the severity of attack.

The brief account of this disease which follows is intended mainly for the information of tea estate staffs and others interested in tea cultivation in the Federation of Malaya.

It should be appreciated that the introduction of “Blister Blight” into Malaya might result in appreciable damage and some loss of crop on highland properties, and it is probable that present cultural methods and routine would require modification and alteration in order to achieve a measure of control over the disease. Hence it is important that local regulations controlling the importation of planting material of tea should not be contravened. Permission to import tea seed for planting must be obtained in writing from the Director of Agriculture, Kuala Lumpur, prior to despatch of consignments from the country supplying the seed. All consignments, if permitted, may need special treatment before despatch and after receipt, and will require to be accompanied by a certificate of freedom from pests and diseases specially endorsed by an approved official of the agricultural organisation of the country in question. Permission to import planting material of tea, other than seed, particularly from countries where the disease is known to occur, is unlikely to be given, except for scientific purposes, and will not be considered, at present, for any type of planting material of tea intended for import by means of air transport.

Symptoms of the Disease.

Small, pale green, pale yellow, deep red or pinkish, translucent, circular spots appear on *young* leaves. In five or six days these spots enlarge

to $\frac{1}{4}$ or $\frac{1}{2}$ in. in diameter and become sunken so that convex areas, resembling blisters, are formed on the under surface of the leaf. The convex surface appears as if it had been dusted with a white or greyish powder. The powdery appearance is due to masses of spores (basidiospores) of the fungus *Exobasidium vexans*, the cause of the disease. The upper, or concave, surface of the leaf spot is smooth and shining and is usually paler green in colour than the unaffected parts of the leaf. Occasionally the blister is reversed, but the spores are almost always found on the under surface. Blisters may coalesce and form irregular spots and, if they occur near the edge or on the midrib, the leaf may become curled, rolled up or otherwise distorted.

The disease can also extend to the leaf stalks and young green stems; blisters are not formed on these, but pale green or yellow (never red) spots appear and become covered with the greyish or white powder of spores. The spots elongate and gradually encircle the stem which becomes slightly swollen at this point. Finally the leaves and buds above the diseased part wither and blacken and the stem bends over or breaks. A badly attacked bush has an unsightly appearance.

Leaves do not become infected after they are four weeks old, hence the leaf damage is confined to the young growth and the buds.

The disease should not be confused with other leaf troubles. Older tea leaves may have a warty or puckered appearance resulting from attack by the pest *Helopeltis*, or may be attacked by other leaf fungi which rarely affect young leaves.

Factors Influencing Infection.

Cool days and nights, with wet or humid conditions, are favourable to infection and spread of the disease. Critical temperatures for the fungus have not yet been accurately determined because of technical difficulties, but attacks are said to be usually much less severe in the warmer, lower levels between 500 to 1,000 feet above sea level in Ceylon. The disease appears to be more severe on bushes grown under shade or adjacent to jungle or wind-breaks, or in damp, low-lying areas where mist persists. During dry weather the fungus may disappear but, unfortunately, is very likely to re-appear when weather conditions again become favourable. The succulent growth developing after pruning is highly susceptible to infection, and, to quote from a report by Mann and mentioned by Petch⁽¹⁾, "takes on an alarming appearance only realised by those who have seen it."

The Effects of the Disease.

Areas pruned at the beginning of a period of wet weather may lose all new growth, and tea bushes which have been cut back may be seriously damaged if the new growth is attacked, thus interfering with the accumulation of food reserves.

Loss of crop may be serious, even though much of the blistered leaf can be manufactured into made tea. Estimates of crop losses can be misleading, but reports indicate that losses of from 4 per cent. to as high as 40 per cent. (in an epidemic) may be experienced.

The disease may also attack seedlings and supplies and render them unsuitable for use as planting material.

Control.

Investigations of control measures are in progress in India and Ceylon and take the form of reducing shade; alteration of pruning dates to avoid a wet weather "break" of new growth; plucking and burning diseased leaves and twigs; spraying with a fungicide where practicable (e.g. nurseries); co-operative action, aiming at eradication; selection and establishment of resistant varieties.

Discussion.

With regard to eradication of the disease in case it should be introduced into Malaya, the chances of success are almost nil. The fungus can spread so rapidly that, by the time it would be discovered, it is probable that a wide area would be infected.

The climatic conditions at Cameron Highlands are likely to favour extension of the fungus during the latter part of the year, i.e. from October to January, and to a lesser extent during April to June. In the July to September quarter it is probable that the fungus would not be much in evidence, and it might be necessary to arrange that recovery from pruning should start at the beginning of this period or in January to March despite the dry weather usually experienced in these months.

Control by dusting or spraying with fungicides is hardly feasible or likely to be economic, except in nurseries and, here, such measures would probably be required. Sulphur dusting appears to be ineffective, but dusts containing copper, and spray mixtures such as Bordeaux mixture or certain proprietary copper fungicides, are likely to prove satisfactory if used frequently.

The most practical method of control will undoubtedly be found in the selection or breeding and establishment of varieties which will combine resistance or immunity to the disease with other desirable characters. The replacement of an existing estate "stand" of bushes with these special varieties would be a slow process, even though it would certainly be desirable, in the long run, from every aspect of tea cultivation. Investigation of this matter is proceeding actively in Ceylon and the stimulus to this work, given by the recent outbreak of "Blister Blight" should result in a more rapid development of the cultural side of the industry on sounder lines.

References.

Further information on this disease can be found in:

1. Petch, T. Diseases of the Tea Bush (Macmillan & Co., London, 1923).
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MECHANIZATION

Quarterly Progress Report, October to December, 1948.

Compiled by the Acting Chief Field Officer.

Recent Importations.

No further machinery is being imported for the time being, apart from certain outstanding orders, pending overall assessment of the merits and demerits of the large number of machines and implements already purchased and in use, which is now in progress.

The following new machines were received during the quarter and are now undergoing tests:—

Auto-Culto Tractor—3 h.p.

Gravely Model L Tractor—5 h.p.

Ottawa Buzz Master—post hole digger and circular saw.

Tarpen Tea Plucking Equipment.

The results of tests carried out during the quarter are as follows:—

(a) *Tractors.*

Two small tractors have been under trial at the Federal Experiment Station, Serdang, for weeding mature tea, just previously pruned. The Howard “Gem” rotary hoe ran well but the effort required to prevent damage to the bushes made work slow and costs averaged \$10.25 per acre, although it is felt that, with practice, these could be reduced. This machine might be useful in young tea but in mature tea it will undoubtedly cause damage. Furthermore, hand weeding will still require to be done near to the tea bush stems.

The other machine under trial was the single-wheeled K.L. garden tractor. This machine was found very difficult to handle among the tea bushes as the position of the engine makes it top-heavy. Little progress was made with the standard rubber wheel and a steel wheel was constructed. The set of cultivators tried with this machine were found incapable of removing the weed growth with any degree of completeness, nor could the work be carried out at sufficient speed to render economic the use of the machine.

(b) *Spraying Equipment.*

Three mechanical sprayers have been under trial at the Federal Experiment Station, Serdang. Of these, the spray attached to the Auto-Culto tractor was useful for spraying fruit trees but the machine was insufficiently manoeuvrable for lalang spraying. The spray pump attachment for the Allen autoscythe, on the other hand, was more suited to this work, being easily manoeuvrable but, with a 4 gallon tin slung on the handle-bars, the spray capacity was hardly sufficient. The Gravely model L garden tractor with its pump spray attachment is readily

manoeuvrable and, although extensive trials have not yet been carried out, this sprayer seems suitable for both fruit trees and lalang.

(c) *Killefer 35R Panbreaker with 1912K Ditcher Attachment.*

Useful results have been obtained with this implement on the heavy coastal clay at Port Swettenham where drains 42 ins. in cross-section at the top, 16 ins. at the bottom and 26 ins. deep have been constructed at a cost of 67 cents per chain, inclusive of hand labour for trimming. The implement was drawn by an H.D. 10 (65 h.p.) tractor but a D.8 wide-gauge tractor (113 h.p.) would probably have been more effective under Port Swettenham conditions. A mole-drainer attachment of 8 ins. diameter has also been under trial but results are not yet available.

(d) *Killefer Cultivator (Chisel) No. 7 G 2.*

This implement is at Port Swettenham awaiting suitable conditions for trial.

(e) *Trusty Cutter-bar.*

This implement is mounted on the standard Trusty bogey and consists of a 40 ins. cutter-bar driven by an independent motor. Trials so far, in Kelantan, have not been particularly successful, as the machine cannot be operated except on smooth ground; the cutter-bar and engine, being mounted immediately in front of the bogey wheel, are inclined to foul any obstruction, thereby necessitating the lifting of the whole bogey over any small drain or bund.

(f) *Ottawa Buzz Master.*

The saw was used to fell and cut up fruit trees at Serdang but was found to be unmanoeuvrable for the latter purpose although quite efficient for felling a standing tree.

The same trouble as regards manoeuvrability was encountered when felling and cutting up oil palms, and a further difficulty encountered was jamming when cutting up the felled palms.

Modifications.

(i) A D.4 tractor at Chenderong Balai, Perak, has been modified in the light of experience during the 1948 cultivation season as follows:—

(a) Fitted with 6 ins. x 34 ins. M.S. shoes with 2 ins. central grousers.

(b) Fitted with 2½ ins. x 2 ins. x 34 ins. hardwood shoes, two on each M.S. shoe. These are removable and will enable traction experiments to be carried out.

(c) Fitted with thin metal tanks to fill up the over-hang on the outside of the tracks.

(ii) Another D.4 at the same centre has been fitted with 34 ins. M.S. shoes with 2 ins. angle grousers.

(iii) A T.D.14 tractor at the same centre is in process of being fitted with 36 ins. shoes to replace the standard 20 ins. ones.

(iv) Drawings have been prepared for the fitting of "Orolo" non-propelled tracks to the McCormick-Deering Combine Harvester.

(v) Steel road bands for fitting to the standard Fordson Major steel wheels were found unsatisfactory in Kelantan when fitted one per wheel. Under these circumstances, the weight of the tractor is carried on one set of lugs and one set of wheel spokes, and numerous fractures have developed as a result.

(vi) The type of paddle wheels for the Fordson Major tractor developed in Province Wellesley proved unsatisfactory on sticky or flooded land in Kelantan. They absorbed practically all the power and the tractor could not be steered.

(vii) A tined harrow was constructed at the same centre for attachment to the rear of the Standard Trusty bogey for use in wet padi fields. Trials so far have proved fairly successful.

(viii) A plate has been fitted at the same centre to the gear selector lever protruding from the top of the gearbox of the Howard rotary hoe which, engaging with lugs on the gear change rods, prevents reverse gear being engaged when forward speeds on the rotor gear are engaged. Reverse can now be engaged only when both the other levers are in the neutral position.

Experiments.

Experiments in the mechanical cultivation of wet padi are being carried out during the current season at Experiment Stations at Bukit Merah (Province Wellesley), Chenderong Balai (Perak), Pulau Gadong (Malacca), and Kota Bharu (Kelantan) as well as on certain areas owned by small-holders. Similar experiments on the cultivation of dry padi are in progress at Melor Experiment Station in Kelantan.

These experiments are concerned with the agronomic aspects of the problem such as the comparative value of soil inversion versus soil stirring, deep versus shallow cultivation and the timing of operations, as well as the engineering aspects involving trials with a wide range of machinery and, in addition, numerous modifications thereof.

The work is being vigorously pursued and many interesting factors have emerged from the cultivation work carried out during the current season. The results of this are now being compiled and will be available in the near future.

Bad weather has interfered with operations on the heavy clay soil at the Federal Experiment Station, Port Swettenham, but a number of investigations have been formulated and will be laid down as soon as conditions permit. These include:

(a) Deep subsoiling and making of beds, in combination with adequate drainage, with Manila hemp as an indicator crop.

(b) The effect of mechanical inter-cultivation on yields of established coconuts.

(c) The drainage requirements of rubber, oil palms and cocoa on heavy clays.

Selected Articles.

WEED KILLERS*

Weed killers have been in use for many years, originally to keep paths free from plant growth. The first of these weed killers was an arsenical preparation, but more recently sodium chlorate has been employed. Both are total herbicides, and their effects are very rapid, causing almost immediate scorching of the leaves, followed by death of the roots. The effects, too, persist for a considerable time.

Such weed killers are, of course, completely unsuited for use in crops. Some thirty years ago, it was noted that top dressings of ammonium sulphate to cereal crops were often accompanied by the scorching of the leafage of weeds, due to the removal of water by the ammonium sulphate crystals on the leaves. More efficacious materials have since been employed, notably ferrous sulphate, copper sulphate, copper chloride, dilute sulphuric acid and, more recently still, dinitro-orthocresol or D.N.O.C. The application of the first four of these involves the use of special spraying equipment, most of which is beyond the resources of the general farmer, and in Britain such spraying was usually undertaken by firms specializing in the subject. Incidentally, sprayers for dilute sulphuric acid had to be lead-lined; to-day, to overcome this difficulty, a fine mist spray of concentrated sulphuric acid is employed which does not require the use of lead-lined plant.

All this last group of differential weed killers produce very rapid effects upon weeds. Within a few hours they are scorched, and they die in the course of a day or two. In fact, the effect is most spectacular. There are, however, some after-effects upon the soil which may be deleterious.

Recently, work has been conducted upon the new synthetic plant hormones, which have been employed in very dilute solutions for the encouragement of the rooting of cuttings; if used at greater concentrations, they kill the cuttings. Some have been employed to prevent premature fruit drop, and here, too, the concentration must be very low or the trees suffer. It was observed that when a comparatively strong solution of one of these plant hormones was sprayed over a mixture of grass and dicotyledonous weeds, the weeds were eventually killed and disappeared while the grass was stimulated. The early synthetic hormones are expensive to produce, so intensive research was instituted which resulted in the production of several easily prepared associated materials which do kill most non-gramineous plants when employed at suitable concentrations. The two generally used to-day are 2-methyl 4-chlorophenoxy acetic acid, commonly known as M.C.P.A., and 2-4 dichlorophenoxy acetic acid commonly known as D.C.P.A., or, in America, as 2 4 D. A third compound is also used in

* By V. A. Beckley, O.B.E., M.C., M.A., A.R.I.C., Senior Agricultural Chemist, Kenya. *The East African Agricultural Journal*, January, 1948.

America, trichlorophenoxy acetic acid, which has been called T.C.P.—a pity in view of the well-known proprietary pharmaceutical preparation.

The effects of these weed killers is nothing like as spectacular as those of the second class mentioned above (ammonium sulphate, etc.). At first, there is a drooping of the leaves, very similar to ordinary wilting. A day or two later, the plants begin to twist and, even if they do not die for many days, death is certain. In addition, there is a well marked stimulation of the grass crop. In my first experiments, I was frankly highly disappointed and gave up inspection of my experimental plots. I visited them a month after treatment and was most surprised to find that practically all the weeds had been killed in the treated plots and that the grass growth was visibly better than on the controls. Further experiments have confirmed my opinion that these hormone weed killers are very valuable for the control of weeds in cereal and grass crops.

In the course of these experiments, it has been established that a lot of the weeds are very sensitive to M.C.P.A. dusts and sprays, and others are more resistant, while some few appear to be hardly affected at all. Dusts are less effective than sprays.

Results so far obtained are summarized in the table below:—

Sensitive (Destroyed by 1 lb. active agent per acre):—

Amaranthus spp., Pigweed.

Brassica sp., Charlock.

Commelina spp., Listening Willie (Spiderwort).

Chenopodium botrys, Stinkweed (Goosefoot).

Datura stramonium (seedling), Datura.

Erigeron.

Tribulus terrestris, Double thorn (Caltrops).

Vigna vexillata, Wild Cowpea.

Slightly Resistant. (Destroyed by 2 to 3 lbs. active agent per acre):—

Alternanthera repens, Joy weed.

Bidens pilosa, Blackjack.

Datura stramonium (flowering), Datura.

Galinsoga parviflora (seedling) Macdonaldii.

Lactuca tarazacifolia, Wild lettuce.

Tagetes minuta (young), Mexican marigold.

Trifolium spp., Clover.

Veronica sp.

Resistant (Killed or affected by 4 lbs. or more active agent per acre):—

Galinsoga parviflora, Macdonaldii.

Oxalis spp., Wood sorrel.

Oxygonum atriplicifolium, Devil thorn.

Cyperus spp., Nut grass.

A NEW METHOD OF ROOTING CUTTINGS OF HEVEA AND OTHER TREES

Propagation of *Hevea* by cuttings has hitherto been successful only when the cuttings were taken from very young nursery plants or from the lower part of the stem of older seedlings. The first to report success was Bobilioff. Nursery plants showing only their first two leaves were ringed with fine wire, and after three weeks the stem above the wire was swollen. Cut at the rings and planted in a moist shady place the cuttings formed roots in another three weeks. Bobilioff also mentioned the earlier success of a Dutch nurseryman in Holland who rooted cuttings from young *Hevea* seedlings in a greenhouse without wiring. No growth substances were used in either of these experiments.

Baptist used strong seedlings about two years old and cut the stem into pieces 15 inches long. The lower sections rooted to some extent (the lowest 19 per cent., next 3 per cent., third from base 3 per cent.) and when growth substance was used the percentages were greater (90 per cent., 28 per cent. and 8 per cent. respectively). Leafless cuttings taken higher up the stem or from branches never produced any roots, even with growth substance. Their reserve materials became exhausted in the shade of the propagator and the cuttings died.

The work of Bobilioff and Baptist is of limited use for practical purposes. If clones are to be propagated on a commercial scale from cuttings, there must be some easy way of rooting terminal cuttings from shoots such as can be produced in quantity by bending down or cutting back budded nursery plants. Roelofsen writing in 1939 on his successful experiments with coffee cuttings in a Trinidad type of propagator in Java, mentions that a great number of leafy top cuttings from strong nursery plants of *Hevea* were tried in the propagator, but after six months only six were still alive and only two of them later formed roots.

The I.C.T.A. propagator was designed in Trinidad for rooting cacao cuttings on a large scale, and Pyke described the principles and technique. Similar propagators have since been built in Java, Puerto Rico and other countries and they have been found suitable for many tropical trees.

The main principle in this type of propagator is the reduction of transpiration to balance the limited uptake of water by the cuttings, and one important means to that end is the reduction of sunlight to about 8 per cent. of its full value. The reduction in solar radiation helps to keep the temperature in the bins below 30°C. as a rule; and in the middle of the day, when air temperature in the tropics sometimes rises to 33° or 34°C., a wet cheesecloth on the glass lids cools the bins by evaporation to about

* By G. Stahel, Landbouwproefstation, Suriname, *Tropical Agriculture*, Vol. XXIV, Nos. 1-3, January-March, 1947.

30°C. The intensity of light in the bins corresponds to that below the trees in a full-grown *Hevea* plantation. More light cannot be given without raising the temperature to a point injurious to the cuttings. Intensity of light is therefore a limiting factor in this type of propagator, and whilst cuttings of shade-tolerant species continue to assimilate in the bins, the method is not so successful for light-demanding trees such as *Hevea*, mango, avocado or sapodilla.

Our first trials with *Hevea* were carried out in a modified form of I.C.T.A. propagator. The bins are 70 x 80 cm. with a free height above the sand of 35 cm. at the front of the bin. The permanent roof at 2 metres above the floor is a screen of bamboo laths 13 mm. wide with square interstices of 32 mm., which reduces the sunlight to a little more than 50 per cent. Just below this permanent roof there are several very light frames covered with a double layer of cheesecloth. They are easily moved between V and T-balks, so that they can be quickly set aside when clouds are over the sun and put back when the sun shines again. The cheesecloth on the glass lids of the propagator is replaced by mosquito net, which not only lets through more light but also has a slightly greater cooling effect when wet.

Experiments showed that it was necessary to use two of the doubly covered cheesecloth frames to keep the temperature in the bins down to 30°C. Without any screen the temperature in the glass-covered bins rose to 48-53°C. and was lowered by the wet mosquito net to 41-47°C. With the bamboo screen in place the figures were 37-44°C. and 35-36°C. respectively. Only with the cheesecloth frames added could the temperature be held down to 30°C.

Attempts were made to compensate the low light intensity by addition of CO₂ to the air in the bins, and 1 to 6 litres of CO₂ per bin per day were administered in fractions every two hours through a hole in the front wall of the bin. The cuttings were tops of strong nursery plants 2 to 3 m. high, grown under very light shade, and had 22 to 24 leaves of which only about twelve were left on at setting, and six to nine cuttings were set in each bin. They remained in fairly good condition for two or three weeks, but after that showed progressive deterioration. Some leaves turned yellow, others were killed by fungi. When a few plants began to shed their leaves the experiment was discontinued.

Even those cuttings that still looked normal showed no trace of starch in the wood, though freshly cut material was full of it. No difference in this respect could be detected between the cuttings manured with CO₂ and those from control bins. Latex was watery and scant. There seems no doubt that under these conditions the light is insufficient for assimilation of carbon dioxide by *Hevea*, at least if the cuttings are from trees grown without shade or under light shade. Some method has therefore to be found by which the cuttings can be kept at a considerably higher light intensity than the I.C.T.A. propagator affords.

The only convenient way that suggested itself was to use a continuous spray of water over open bins. This would keep the leaves cool both by contact and by evaporation, would provide a permanently saturated atmosphere, and also allow a continuous supply of CO_2 by free ventilation. The question was whether the cuttings could endure a daily rain of 8 hours for weeks in succession.

In subsequent experiments the glass lids were left on the bins (with suitable screens) until 9 a.m. and replaced at 5 p.m. Between these hours the lids were taken off and the continuous spray used instead. Ideally the spraying should be done with a motor-driven sprayer producing fine mist round the cuttings, but as this was not available the preliminary experiments had to be made with knapsack sprayers giving a coarser spray than was thought desirable. Nevertheless the *Hevea* cuttings did very well in the 8 hours daily rain with about 50 per cent. sunlight, and after some weeks looked even more healthy than at the beginning.

Six bins containing coarse river sand of granitic origin were planted with cuttings, on which about 12 leaves were left and the bigger ones cut back to one half. The treatments were as follows:—

- A. 2 bins (19 cuttings altogether) of terminal cuttings from strong 2-year-old seedlings.
- B. 1 bin (12 cuttings) of similar cuttings manured daily with CO_2 ($\frac{1}{2}$ litre every hour from 8 a.m. to 1 p.m.).
- C. 2 bins of cuttings from side branches of an old tree; one bin manured with CO_2 and one not.
- D. 1 bin of subterminal cuttings from strong seedlings.

All the material was cut towards the end of the long dry season and was thus in a resting condition. The cut ends were washed for about an hour in water to remove the latex and then dipped for a few seconds in a 0.5 mgr./cc. alcoholic solution of indol-butyric acid. Four weeks later the treatment was repeated with 1.5 mgr./cc. indol-butyric acid.

After 6 to 8 weeks, ten of the 19 cuttings in A had one or several roots, but of those in B only two rooted. In C no roots were formed, and in D only one cutting had roots. The terminal cuttings manured with CO_2 produced a much more abundant callus than the untreated ones, though fewer rooted; and there was likewise a more abundant callus on the cuttings from side branches manured with CO_2 than on the untreated controls.

In a second trial two of the six bins were set with cacao, one with 12 ordinary branch cuttings and one with 48 single-leaf cuttings with 1 in. of stem. Two-thirds of these cuttings were treated with a 2 mgr./cc. alcoholic solution of indol-butyric acid and one-third was left untreated. Of the 12 ordinary cuttings, six formed roots within 4 weeks, one of them an untreated cutting. The single-leaf cuttings were planted in various media—one row of 16 in coarse river sand, one row in a mixture of river sand and humus, one row in river sand. The best results were from the first row,

in which ten of the leaves had roots within 3 weeks, some of them rooting very freely.

Later trials showed that for cacao less light was desirable than for *Hevea*. When light was reduced by a suitable overhead screen to about 25 per cent., with the spray used from 9 a.m. to 5 p.m., single-leaf cuttings from a young well-manured tree gave 95 per cent. rooting with indol-butyric acid treatment (2 mgr./cc. alcoholic solution) and 88 per cent. without it. Well rooted single-leaf cuttings hardened easily in half-closed bins. The axillary buds grew out within a month after planting in baskets, and took about four months to develop to a size suitable for planting in the field. This method is particularly useful when only small quantities of nursery material are available, which it is desired to multiply as quickly as possible. Vigorous, well-manured nursery stock is, however, essential for full success.

Branch cuttings of sapodilla (*Achras zapota* L.) root only with great difficulty, if at all. But cuttings from vigorous sucker growth gave 40 per cent. rooting without growth substance and 90 per cent. when treated with a 2 mgr. solution of indol-butyric acid. Water-shoots of avocado (*Persea americana* Mill.) with similar treatment gave 60 per cent. rooting after 12 weeks.

These experiments will be continued on a bigger scale when new propagators and a power sprayer are available. The preliminary results show that by the spray method cuttings of various tropical trees can be kept in full health for months, and in many cases rooted, by exposure to much more light than is possible in closed bins. They are therefore published now in the hope of encouraging similar experiments in other tropical countries.

Summary.

Cuttings of *Hevea* and some other light-demanding trees cannot be successfully rooted in the I.C.T.A. propagator on account of the low light intensity. By removing the lids in the daytime and keeping the cuttings continuously sprayed with water, the light may be increased up to 50 per cent. of full sunlight with beneficial results. With 25 per cent. sunlight and the continuous daytime spray cacao can be propagated by single-leaf cuttings, which have some advantages over branch-cuttings.

In an experiment where CO_2 was added to the atmosphere round the cuttings there was increased callus formation but the number of cuttings rooting was less than in the controls.

Notes and Comments.

GIFTS TO PADI PLANTERS.

As a result of a series of floods following the drenching of the Muda bund, 700 acres of padi and 113 acres of vegetables and tapioca in Province Wellesley were destroyed in the latter part of 1947.

The plight of the cultivators of this land was taken up by the Province Wellesley Malay Association and compensation amounting to \$38,374 has recently been paid by Government at the rate of \$50 per acre for padi and vegetable land, and \$37.50 per acre for tapioca land.

CANNING RESEARCH STATION.

There is a large selection of books, pamphlets and technical journals in the library of the Canning Research Station, Johore Bahru, which may be consulted by persons interested in the subject of canning. The Station is closed on the official holidays of the State of Johore and at week-ends.

IMPORTATION OF PLANTS.

It is particularly important that no planting material of rubber, tea, cacao or Manila hemp should be imported into Malaya except under the terms of a permit granted only by the Director of Agriculture. It is also important that no planting material whatsoever should be imported *direct* from those parts of the American continents including adjacent islands which lie between the Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N.}$) and the Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S.}$). Importation of such material would increase the chances of introducing South American leaf disease of Hevea, and under present Departmental arrangements such material can only be imported after quarantine in an approved quarantine station which is situated outside the latitudes mentioned above.

In the case of tea, the disease "Blister Blight" has now appeared in Ceylon and South India and is causing concern on properties situated at elevations above 500 feet. In the case of cacao and Manila hemp these potential new industries must be protected against the introduction of virus and other diseases.

The present position regarding Plant Importation Regulations in the Federation of Malaya is as follows. The Prohibition of Imports Order, 1946, (made under the Transfer of Powers and Interpretation Ordinance) cancelled the former F.M.S. (and Perlis) Plant Importation Rules which were operated under the Customs Enactment, and prohibited the importation into the Malayan Union of all goods whatsoever except under an import licence issued by or on behalf of the Comptroller of Customs. In the case of planting material the Customs Department were, however, asked to seek the Director of Agriculture's approval before issuing an import licence.

In January, 1948, the Prohibition of Imports Order, 1946, was amended by an Open General Licence which allowed the importation of many goods including plants without an import licence. In order to control the importation of plants, however, this Open General Licence was later amended by Gazette Notification No. 389 of 18th March 1948, which provides that import licences are still required for 'plants of all species except as approved by the Director of Agriculture.'

Imports by air, from Australia and Singapore only, are at present permitted in respect of a number of fresh fruits and vegetables, for which the Director of Agriculture has given permission. Other requests for permission to import by air are granted or refused at the discretion of the Director of Agriculture.

RUBBER SMALL-HOLDINGS ENQUIRY COMMITTEE.

Giving effect to a motion by the Honourable Tuan Sheikh Ahmad bin Sheikh Mustapha in the Federal Legislative Council on the 5th October, 1948, His Excellency the High Commissioner has appointed a Committee with the following terms of reference:—

I. To report to what extent rubber trees on small-holdings have reached a condition or age when it is no longer economic to maintain them (having regard to the general standard of production in big estates) and for that purpose to collect such evidence or data as the Committee may consider necessary;

II. To suggest how best owners of small-holdings can be persuaded to plant or replant their holdings with high yielding rubber and to consider whether legislation is necessary and, if so, to suggest what main provisions such legislation should cover;

III. To consider and report if it is necessary that small-holders should be assisted by Government to replant their rubber holdings with high yielding rubber and, if so, to suggest in what form and in what manner such assistance should be given and under what circumstances and on what conditions; and

IV. Generally to report on such factors as directly affect the economic life of rubber trees on small-holdings and how the rate of production of such holdings can be maintained at a level higher than they are at present.

The following have been appointed members of the Committee:

The Director of Agriculture (Chairman).

The Economic Secretary.

The Honourable Tuan Haji Mohamed Eusoff bin Mohd. Yusoff,
O.B.E., M.C.S.

The Honourable Mr. E. E. C. Thuraisingham.

The Honourable Mr. Khoo Teik Ee, J.P.

The Committee has power to co-opt additional members. The Assistant to the Agricultural Economist, Department of Agriculture, has been appointed Secretary to the Committee.

THE MALAYAN NATURE JOURNAL.

The Journal of the Malayan Nature Society continues to maintain its high standard, and the issue for December, 1948, has a wealth of interesting articles.

A very useful series of articles on Malayan wild flowers is commenced, consisting of instalments from a book on the subject which Mr. M. R. Henderson of the Singapore Botanic Gardens is writing.

A new section is for school-children, but most adult readers will enjoy the article on pet rats by Mr. J. L. Harrison as much as younger readers.

The Malayan Nature Society already has about twice its pre-war membership, and should receive the support of all interested in natural history. The annual subscription is \$10 which entitles the member to the free issue of the Journal, which otherwise costs \$3 per copy. The Honorary Secretary and Treasurer is Mr. E. J. H. Berwick, State Agricultural Officer, Selangor, Kuala Lumpur.

FROM THE DISTRICTS

*Compiled by the Acting Chief Field Officer from Monthly Reports of
State/Settlement Agricultural Officers.*

September, October and November, 1948.

The Weather.

Rainfall in September was generally below average except in parts of Johore and Negri Sembilan. Conditions during October were more or less normal. November was a dry month in the north-western areas but rainfall was above average in the central and southern areas.

Crop Reports.

PADI.

Improvements to Padi Areas.—Work carried out by the Department during the year, with the assistance of the Drainage & Irrigation Department and utilising Food Production funds, has affected a total of 114,000 acres of padi land, of which 28,000 acres represent new padi land. The planted acreage for the current season is estimated to exceed that of the 1947-48 season by approximately 60,000 acres.

1948-49 Season.—In Kedah and Province Wellesley the prolonged dry weather has adversely affected the crop except in the irrigated areas and it would appear that average yields this season may be lower as compared with the 1947-48 season, although the planted acreage has increased. Conditions are reported as favourable in the Krian and Sungei Manik areas of Perak. Water control has been fairly satisfactory in the coastal areas of Selangor except for some 2,000 acres in Sabak Bernam and in scattered areas at Tanjong Karang where too deep water has held up transplanting. Harvesting is in progress in Negri Sembilan and the inland districts of Malacca and good crops are being reaped. Crop cutting tests in Jelebu District have indicated yields varying from 200 to 850 gantangs per acre. Good crops are likewise being harvested in North Johore. In Kelantan the cultivators have done extremely well this season and an excellent crop is in prospect. Harvesting of early planted wet padi is in progress in this State and crop cutting tests have indicated yields varying from 210 to 680 gantangs per acre. Transplanting of the main Trengganu crop is completed and harvesting of the early planted wet padi crop is in progress; indications are that yields are better this season as compared with last. In Pahang, harvesting is taking place in the riverine mukims. A certain amount of damage was caused to the crop, more particularly in Temerloh District, as the result of floods in early November.

FOODCROPS AND VEGETABLES.

A number of districts have reported restriction of planting due to the existing emergency although, generally speaking, production has been well maintained. Tapioca and sweet potatoes continue to be the most popular crops from a planting point of view.

The major production areas in Johore, i.e. Senai, Kulai, and Ayer Bemban, by virtue of their proximity to the Singapore market, continue to expand, and the area north of Ayer Bemban on the main trunk road is fast developing. Another important producing area in this State is the Tangkak District.

Colocasia is an important crop in Lower Perak District, and supplies are despatched to all parts of the country.

RUBBER.

Prices declined during the quarter, and the acreage of small-holdings in tapping tended also to decline, due to a combination of lawlessness, padi planting and shortage of labour generally.

During 1948 a total of 1,539 acres of small-holding rubber were budded or planted with clonal seed under the supervision of the small-holders' advisory staff, of which 1,146 acres represented replanted rubber and the balance of 393 acres new plantings.

Interest in the construction of smoke-houses continues to be maintained in those States, e.g. Pahang, Trengganu, where the price differential between smoked and unsmoked sheet is sufficiently wide and where alternative facilities for smoking, at reasonable rates, are unobtainable.

Good progress was made with the inauguration of rubber demonstration plots in certain States.

COCONUTS.

Prices of copra and coconut oil have tended to vary by localities to a considerable extent.

Improvement in the quality of copra produced by the small-holder is largely dependent on the price difference between the wet and dry product and only in the east coast States is this reflected, at present, in the interest shown in the use of improved type kilns.

The survey of holdings on the west coast of Johore was continued to investigate the difference between present-day yields and those of 1941.

FRUIT.

Good crops have been reported during the quarter from Perak, Province Wellesley and Trengganu.

Pineapples.—Reports from Johore indicate that approximately 4,300 acres of peat land have been cleared by the cannery interests and about 1,300 acres planted. The small season will be somewhat later than usual with cropping commencing in mid-December.

Agricultural Stations.

Rubber.—Areas of clonal seedling nurseries were laid down at Departmental Stations in all States during the quarter. These will supplement the existing 60 acres of budwood nurseries as a supply of high-yielding planting material for distribution to small-holders.

Cocoa.—Sites have been selected on several Stations for trials with this crop and the laying down of experiments is already under way in some States.

Manila Hemp.—All available planting material from Departmental Stations is being supplied, on request, to commercial interests for trial on a number of estates throughout the country.

Fruit.—Budding programmes are being expedited to increase the supply of improved planting material to small-holders.

Padi.—Varietal selection work as well as cultivation and manurial trials are in progress at a large number of Stations throughout the country.

The progress of the mechanical experiments on wet and dry padi is described elsewhere in this issue.

Vegetables.—Trials of a wide range of improved vegetables are in progress at Cameron Highlands where manurial experiments are also being carried out.

Livestock.—Rehabilitation and expansion of the poultry accommodation has been carried out at a number of Stations in preparation for increasing the size of flocks.

Numerous services were carried out by Middle White boars, both Departmental and privately owned, more particularly in Penang and Province Wellesley.

The stud goats at Sabak Bernam and Malacca performed a number of services but the Kelantan animal was not in demand.

Miscellaneous.

Pests.—The emergency continued to interfere with pig hunting, notwithstanding which, over 9,000 animals were killed during the quarter.

The drive against rats appears to have been successful in the great majority of the padi areas.

General.—Increased interest is being evinced by small-holders in mechanical equipment of the light horticultural type and demonstrations have been held of this type of machinery at various centres.

DEPARTMENTAL NOTES

New Year's Honours List.

His Majesty the King has been graciously pleased to appoint Mr. Gunn Lay Teik, Acting Senior Chemist, to be an Officer of the Most Excellent Order of the British Empire (Civil Division).

Appointments.

Mr. R. G. H. Wilshaw, Chief Research Officer, has been appointed to act as Director of Agriculture, Federation of Malaya, with effect from 1st November, 1948.

H.H. Tengku Yaacob ibni al-marhum Sultan Abdul Hamid, C.M.G., Senior Agricultural Officer, has been appointed to act as Deputy Director of Agriculture with effect from 1st November, 1948.

Mr. R. G. Heath, Senior Agricultural Officer, has been appointed to act as Chief Field Officer with effect from 8th November, 1948.

Dr. T. A. Buckley, Senior Chemist, has been appointed to act as Chief Research Officer with effect from 19th October, 1948.

Dr. S. G. Willimott, Chemist (Soils), has been appointed to act as Senior Chemist (Soils) with effect from 1st January, 1948.

Mr. C. W. S. Hartley, Agricultural Officer (Research), has been appointed to act as Senior Agricultural Officer, (Research) with effect from 1st August, 1948.

Mr. H. D. Matheson, B.Sc., has been appointed to be an Agricultural Officer, Department of Agriculture, Federation of Malaya, with effect from 15th October, 1948. Mr. Matheson arrived in Malaya on 26th November, 1948, and assumed duty as Agricultural Officer, Food Production, with effect from 27th November, 1948 at the Federal Experiment Station, Serdang, Selangor.

Promotions.

The Right Honourable the Secretary of State for the Colonies has been pleased to approve the promotion of H.H. Tengku Yaacob ibni al-marhum Sultan Abdul Hamid, C.M.G., Agricultural Officer, to be Senior Agricultural Officer, Malayan Agricultural Service, with effect from the 1st April, 1946.

The Right Honourable the Secretary of State for the Colonies has been pleased to approve the promotion of Mr. H. L. Barnett, Agricultural Economist, Department of Agriculture, Federation of Malaya, to be Registrar of Statistics, Federation of Malaya, with effect from the 23rd December, 1947. Mr. Barnett will temporarily continue to carry out the duties of Agricultural Economist in addition to those of his substantive appointment.

Transfers.

Mr. D. G. Jones, Agricultural Officer, relinquished duty as Agricultural Officer (Research), Federal Experiment Station, Serdang, on transfer to the post of Agricultural Officer, Malacca, with effect from 5th November, 1948.

Mr. P. G. Coleman, Agricultural Officer, relinquished duty as Agricultural Officer, Food Production, on transfer to the post of Agricultural Officer, Penang and Province Wellesley, with effect from 29th October, 1948.

Leave.

Dr. T. A. Buckley, Senior Chemist, returned from leave on 17th October, 1948.

Mr. J. L. Greig, Senior Agricultural Officer, returned from leave on 17th October, 1948, and assumed duty as State Agricultural Officer, Johore, with effect from 11th November, 1949.

Mr. H. T. Pagden, Senior Entomologist, returned from leave on 18th October, 1948, and resumed duty on 22nd October, 1948.

Mr. J. Cook, Agricultural Officer, returned from leave on 1st January, 1949, and assumed duty as State Agricultural Officer, Kedah and Perlis, with effect from 3rd January, 1949.

Dr. A. E. S. McIntosh, Deputy Director of Agriculture and Acting Director of Agriculture, has been granted 173 days leave, in addition to voyages, with effect from 6th November, 1948.

Mr. J. R. P. Soper, Senior Agricultural Officer and Acting Chief Field Officer, has been granted 255 days leave, in addition to voyages, with effect from 6th November, 1948.

Mr. H. J. Simpson, Agricultural Officer, has been granted 292 days leave, in addition to voyages, with effect from 6th November, 1948.

Mr. H. M. James, M.C., Agricultural Officer, has been granted 280 days leave, in addition to voyages, with effect from 5th November, 1948.

Retirement.

Mr. B. G. A. Lowe, Agricultural Officer, retired, on medical grounds, with effect from 2nd November, 1948.

Statistical

MARKET PRICES

October to December 1948.

Rubber.—The Singapore price of No. 1 R.S.S. Spot loose advanced during October from 43½ cents per lb. on the 1st to 44½ cents on the 14th. The price, however, declined sharply and on the 30th was only 41½ cents. The average price for October was 43.31 cents. The decline continued in November and the month closed with the price at 34½ cents per lb., the average being 38.24 cents. December opened with the price at 34½ cents and by the 13th of the month the price had reached 38½ cents. The advance, however, did not continue and on the 29th December the price had dropped to 36½ cents, giving an average of 36.53 cents for the month.

The average prices paid in London and New York were: London, October 12.28, November 11.27 and December 10.80 pence per lb.: New York, October 21.37, November 19.70, and December 18.57 cents gold per lb.

The average prices for small-holders' rubber at three centres during the third quarter of 1948 are given below in Table I.

Table I.

**Average Monthly Prices Paid by Local Dealers for Small-Holders' Rubber,
October-December, 1948.**

(Dollars per picul of 133½ lbs.)

Grades	Kuala Kangsar, Perak.			Seremban Negri Sembilan.			Batu Pahat, Johore.		
	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.	Oct.	Nov.	Dec.
Smoked Sheet ..	51.85	45.45	42.45	51.88	45.70	43.35	46.95	42.98	41.54
Unsmoked Sheet ..	43.78	37.25	34.25	42.44	38.00	35.92	33.44	38.63	37.94
Scrap ..	23.13	19.75	18.00	14.00	12.00	11.20	11.19	10.19	9.81

Transport from Batu Pahat to Singapore by lorry, excluding duty, 80 cents to \$1 per picul.

Tea.—The latest Colombo prices available quoted from "The Ceylon Tea Market Report" of 21st December, 1948, of the 'Colombo Brokers' Association, are as follows, in rupees per lb.: High Grown Teas Rs. 1.62, Medium Grown Teas Rs. 1.42, Low Grown Teas Rs. 1.46.

There is an export duty of 38 rupee cents per lb. which is payable by the buyer, in addition to the above prices.

The retail price of Malayan tea (Boh) is \$2 per lb.

Derris.—There was another minor rise in the price of this commodity during September when the average was \$72 to \$74 per picul of 5 per cent. rotenone root delivered loose into Singapore godown. With demand exceeding available supplies the increase in price continued during October and November, average prices being: October \$74 to \$76 per picul, November \$77 to \$79 per picul.

Rice.—The rice ration per person per week was reduced from 3 to 2½ katis with effect from 1st November, 1948. The controlled price of rice remained at \$30 per picul.

Padi.—The Government guaranteed price of padi continues to be \$15 per picul delivered at the mill and \$14.20 per picul for padi purchased in the field.

Tobacco.—The range of market prices of No. 1 cured leaf in Kelantan showed a rise in October to \$450 to \$550 per picul and continued at this level during November and December. The prices of 2nd and 3rd quality remained steady during the last quarter of 1948, at \$300 to \$430 and \$170 to \$270 respectively.

Table II.
Singapore Prices of Various Agricultural Products.

Product	December, 1948			November 1948	October 1948	Average Price 1947
	Highest	Lowest	Average	Average	Average	
	per picul \$	per picul \$	per picul \$	per picul \$	per picul \$	per picul \$
Copra:						
Sundried No. 1 ..	36.50	36.00	36.44	33.87	32.14	21.28
Coconut Oil ..	65.00	62.00	62.46	58.87	56.77	35.49
Coffee:						
Padang Bali No. 1	120.00	120.00	120.00	120.00	120.00	109.10
Palembang No. 1	58.00	58.00	58.00	58.00	58.00	65.13
Sourabaya No. 1	74.00	74.00	74.00	74.00	74.00	79.15
Pepper:						
Muntok White ..	211.00	196.00	203.46	199.96	212.86	124.65
Sarawak ..	210.00	195.00	202.46	198.96	211.86	116.85
Cloves:						
Indian ..	*	*	*	*	44.00	41.85
Sumatra ..	*	*	*	*	47.00	51.70
Gambier:						
Rounds No. 1 ..	*	*	*	*	125.00	130.81
Sago Flour:						
Lingga ..	19.00	17.25	18.32	19.10	20.30	16.25
Tapioca Flour:						
Malayan No. 1 ..	28.00	28.00	28.00	27.52	29.05	28.15

* Not quoted.

FEDERATION OF MALAYA **PRODUCTION OF PALM OIL AND KERNELS.**

(In long tons as declared by Estates)

MONTH	PALM OIL		PALM KERNELS	
	1947	1948	1947	1948
January ..	2,238.2	3,821.9	292.3	664.1
February ..	2,316.9	3,659.8	337.1	677.9
March ..	2,585.8	3,567.6	386.2	633.0
April ..	2,410.2	3,598.6	380.2	699.4
May ..	2,377.7	3,076.5	359.9	597.4
June ..	2,451.2	2,420.1	336.1	431.0
July ..	3,479.4	3,245.5	452.6	564.9
August ..	3,558.5	3,617.8	551.0	690.2
September ..	3,887.3	4,283.4	583.1	827.2
October ..	4,465.0	4,376.6	635.9	899.4
November ..	4,483.9	4,827.2	658.4	913.6
December ..	4,860.9	4,762.4	764.4	873.0
Total ..	39,115.0	45,257.4	5,737.2	8,471.1

In December, 41 estates (planted area 79,904 acres) were in production out of a total of 48 oil palm estates (planted area 81,991 acres).

MALAYAN AGRICULTURAL EXPORTS, **JULY-SEPTEMBER, 1948.**

Product	NET EXPORTS IN TONS.				
	Year 1947	April-June 1947	April-June 1948	July-Sept. 1947	July-Sept. 1948
Arecanuts ..	12,507	812	1,725	3,976	2,483
Coconuts fresh†	62,873†	20,126†	15,347†	29,917†	6,922†
Coconut oil‡	41,112	8,767	9,435	10,624	10,176
Copra‡	45,439*	12,974*	10,197*	13,285*	3,725*
Copra cake ..	5,260*	1,683*	2,052*	1,643*	5,061*
Gambier, all kinds ..	1,156	438	118	205	145
Palm kernels ..	5,245	1,019	2,464	1,487	711
Palm Oil ..	43,325	5,601	11,700	10,089	10,479
Pineapples, canned ..	2,611	65	514	1,293	2,135
Rubber¶	645,229¶	149,504¶	176,609¶	156,306¶	178,969¶
Sago,—flour ..	5,958	57	1,456*	3,334	8,612*
" —pearl ..	2,404	1,827	4,194	1,791	6,452
" —raw ..	6,415*	1,750*	1,001*	1,766*	1,878*
Tapioca,—flake ..	52	7*	77	9	118
" —flour ..	6,490	2,533	686*	784	655*
" —pearl ..	7,205	2,843	4,798	2,064	3,913
Derris ..	243	50	13	30*	33
‡Copra equivalent ..	22,625	1,675	5,442	4,604	12,949

¶ production (Federation of Malaya).

† hundreds in number.

* net imports.

FEDERATION OF MALAYA

PADI SEASON 1948-1949.

Acreages of WET Padi Planted monthly during 1948 and Percentages of Total Planted Area.

State/Settlement (1)	Feb.-Aug. (2)		September (3)		October (4)		November (5)		Total (6)		Total- Area Planted and to be Planted (Acres) (7)	Per cent (8)
	Planted Acres	Per cent of (7)	Planted Acres	Per cent of (7)	Planted Acres	Per cent of (7)	Planted Acres	Per cent of (7)	Planted Acres	Per cent of (7)		
Perlis	5,900	13.58	9,123	21.01	18,068	41.60	10,339	23.81	43,430	100.00	43,430	5.07
Kedah	59,759	21.83	117,264	42.84	68,519	25.03	24,376	8.90	269,918	98.60	273,718	31.92
Kelantan	12,880	8.96	52,136	36.26	53,976	37.54	19,321	13.44	138,313	96.20	143,772	16.77
Trengganu	10,575	23.75	4,029	9.05	17,669	39.68	11,182	25.11	43,455	97.59	44,526	5.19
Penang & P. Wellesley	168	0.43	5,481	13.87	23,748	60.10	9,358	23.68	38,755	98.08	39,514	4.61
Perak	21,012	16.56	37,044	29.19	37,608	29.64	21,619	17.03	117,283	92.42	126,897	14.80
Selangor	4,859	9.80	290	0.59	2,365	4.77	6,414	12.94	13,298	28.10	49,568	5.78
Pahang	40,787	86.50	2,852	6.05	1,775	3.76	1,323	2.81	46,737	99.12	47,149	5.50
N. Sembilan	34,057	98.21	173	0.49	10	0.03	51	0.15	34,291	98.88	34,678	4.04
Malacca	18,931	58.60	5,846	18.09	4,396	13.61	2,635	8.16	31,808	98.46	32,306	3.77
Johore	16,582	75.79	2,375	10.86	1,276	5.83	292	1.33	20,525	93.81	21,879	2.55
Total	225,510	26.30	236,613	27.59	229,410	26.76	106,910	12.47	798,443	93.12	857,437	100.00

Compiled and published by the Registrar of Statistics, Federation of Malaya, from returns received through the Field Branch of the Department of Agriculture.

FEDERATION OF MALAYA.

PADI SEASON 1948-1949.

Total Acreages of WET and DRY Padi Planted and to be Planted.

State/Settlement	WET PADI		Total PADI Planted and to be Planted Acres	TOTAL Wet and Dry Padi Area Planted and to be Planted Acres
	Planted by 30th November Acres	Total Planted and to be Planted Acres		
Perlis ..	43,430	43,430	64*	43,494
Kedah ..	269,918	273,718	4,190*	277,908
Kelantan ..	138,313	143,772	33,463	177,235
Trengganu ..	43,455	44,526	10,501	55,027
Penang & P. Wellesley ..	38,755	39,514	1,793	41,307
Perak ..	117,283	126,897	9,998	136,895
Selangor ..	13,928	49,568	1,318*	50,886
Pahang ..	46,737	47,149	969	48,118
N. Sembilan ..	34,291	34,678	23	34,701
Malacca ..	31,808	32,306	72	32,378
Johore ..	20,525	21,879	2,795	24,674
Total	798,443	857,437	65,186	922,623

* Area planted to 30th November, 1948.

Compiled and published by the Registrar of Statistics, Federation of Malaya, from returns received through the Field Branch of the Department of Agriculture.

FEDERATION OF MALAYA RUBBER PRODUCTION.

(In long tons, dry weight)

MONTH	ESTATES		SMALL-HOLDINGS (ESTIMATED)		TOTAL	
	1947	1948	1947	1948	1947	1948
January ..	25,822	34,668	26,748	27,321	52,570	61,989
February ..	26,633	28,529	23,370	22,121	50,003	50,650
March ..	27,552	31,888	31,230	26,549	58,782	58,437
April ..	25,300	32,724	24,323	33,684	49,623	66,408
May ..	29,127	33,294	18,009	16,313	47,136	49,607
June ..	30,717	33,246	22,028	27,348	52,745	60,594
July ..	33,366	35,193	20,407	22,972	53,773	58,165
August ..	28,514	33,727	20,537	22,875	49,051	56,602
September ..	32,070	33,292	21,412	30,910	53,482	64,202
October ..	33,078	34,020	31,844	16,347	64,922	50,367
November ..	36,050	34,149	18,419	27,822	54,469	61,971
December ..	31,636	38,177	27,037	19,809	58,673	57,986
Total ..	359,865	402,907	285,364	294,071	645,229	696,978
Total 1946 ..	173,515		229,692		403,207	

Small-holding production is estimated from the formula: Production + imports + opening stocks = exports + consumption + closing stocks.

FEDERATION OF MALAYA
PRODUCTION OF COPRA, COCONUT OIL AND COPRA CAKE.
(in tons)

Month	COPRA PRODUCTION		COCONUT OIL PRODUCTION			COPRA CAKE (POONAC) MANUFACTURED	
	Estates 1948	Small-holdings (estimated) 1948	COPRA TREATED		COCONUT OIL EXPRESSED	1947	1948
			1947	1948			
January	..	..	7,324	6,429	3,703	3,034	2,512
February	..	..	7,632	6,231	3,892	3,138	2,432
March	..	..	8,267	7,614	4,264	3,351	2,913
April	..	..	7,590	8,146	3,897	3,071	3,223
May	..	..	8,511	6,225	4,355	3,396	2,446
June	..	..	8,458	7,620	4,370	3,443	2,955
July	..	..	9,408	7,340	4,808	3,826	2,901
August	..	..	8,801	8,840	4,491	3,614	3,484
September	..	..	8,902	9,972	4,554	3,651	3,730
October	..	..	8,753	10,709	4,478	3,560	3,933
November	..	..	8,518	9,386	4,329	3,454	3,669
December	..	..	7,994	10,538	4,045	3,222	3,722
Total	..	..	100,158	99,050	51,186	40,760	37,970

- Notes:—1. The above statistics are compiled and published by the Registrar of Statistics, Federation of Malaya.
2. Estate copra production and coconut oil production are as declared by estates and oil mills respectively.
3. Statistics of small-holding coconut oil production are not available.
4. Small-holding copra production for commercial purposes is estimated from the formula: imports + estate stocks (opening) + estate production + small-holding production = exports + local oil mill consumption + estate stocks (closing).
5. Statistics for copra production are not available prior to July, 1948.
* Including an adjustment for export difference of 1,048 tons.

METEOROLOGICAL SUMMARY, MALAYA, SEPTEMBER, 1948.

LOCALITY.	AIR TEMPERATURE DEGREES FAHRENHEIT							EARTH TEMPERATURE		RAINFALL							BRIGHT SUNSHINE			
	Means of			Absolute Extremes				At 1 foot of F.	At 4 feet of F.	Total	Most in a day.		Number of days					Total	Daily Mean	Per cent.
	A.	B.	Min.	Mean of A and B.	Highest.	Lowest.	Max.				Highest Min.									
Ipoh, Perak	90.9	72.5	81.7	94	70	85	75			ins.	m.m.	ins.	Precipitation .01 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more				
Port Swettenham, Selangor	89.0	72.7	80.9	93	69	82	76		85.9	5.68	144.3	0.91	18	22	2		2			
K. Lumpur, Selangor	89.7	72.3	81.0	94	69	82	75			7.64	194.1	2.75	16	11	2					
Sitiawan, Perak	88.9	72.4	80.7	92	70	83	75		84.6	6.39	162.3	3.09	19	13	5	3				
Kuala Lipis, Pahang	89.1	71.2	80.1	94	69	85	73		84.9	5.40	137.2	1.89	16	10	4	1				
Kuantan, Pahang	90.3	71.0	80.7	98	68	86	74			6.68	169.7	2.30	16	12	2	21				
Temerloh, Pahang	-	-	-	-	70	-	74			12.95	328.9	2.95	17	14	8	8				
Bayan Lepas, Penang	87.1	74.2	80.7	90	71	83	76			6.19	157.2	1.09	19	16		11				
Malacca										8.46	214.9	2.85	17	14	5					
Mersing, Johore	86.2	71.6	78.9	90	68	80	73			5.66	143.8	1.29	17	14	2					
Alor Star, Kedah	87.1	73.5	80.3	91	72	80	75			8.71	221.2	1.68	15	12						
Kota Bharu, Kelantan	-	73.0	-	-	71	-	75		85.1	10.18	258.6	2.94	23	18	6					
K. Trengganu, Trengganu	88.7	72.4	80.5	91	71	83	74			7.38	187.5	1.34	22	18	4					
HILL STATIONS.																				
Fraser's Hill,																				
Pahang 4268 ft.	73.4	61.6	67.5	77	60	70	64		71.5	5.82	142.8	1.49	18	14	1	7				
Cameron Highlands, Tanah																				
Rata, Pahang 4750 ft.	72.3	55.8	64.1	75	51	68	59		69.4	6.40	162.6	1.48	23	18	1	1				

Compiled from Returns supplied by the Malayan Meteorological Service.

METEOROLOGICAL SUMMARY, MALAYA, OCTOBER, 1948.

LOCALITY.	AIR TEMPERATURE DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE						
	Means of			Absolute Extremes		At 1 foot °F	At 4 feet °F	Total		Number of days		Precipitation .01 in or more	Precipitation .04 in or more	Thunder-storm	Fog morning obs.	Gale force 8 or more	Total	Daily Mean	Per cent.
	A.	B.	Min.	Max.	Lowest														
	Max.	Min.	Mean of A and B	Lowest	Max.	Lowest	Highest	ins.	m.m.	ins.	Amt.	Most in a day.							
Ipoh, Perak	90.0	72.5	81.3	94	70	86	75	11.23	285.2	ins.	20	17	4	1					
Port Swettenham, Selangor	89.3	72.7	81.0	93	70	83	75	9.32	236.7	2.50	20	15	5						
K. Lumpur, Selangor	89.6	72.5	81.1	93	70	82	75	9.60	243.8	1.92	23	22	11	4					
Sitiawan, Perak	88.7	72.3	80.5	91	71	85	74	7.55	191.8	1.21	19	17		1					
Kuala Lipis, Pahang	88.7	71.4	80.1	92	69	82	73	11.69	296.9	2.75	24	21	4	21					
Kuantan, Pahang	90.3	71.1	80.7	93	68	84	74	13.74	349.0	5.20	19	18	8	8					
Temerloh, Pahang	-	72.8	-	-	71	-	75	8.01	203.5	2.74	22	17		4					
Bayan Lepas, Penang	86.7	74.3	80.5	90	72	81	77	16.52	419.6	4.37	23	20	10						
Malacca	85.5	73.3	79.4	88	72	81	76	9.07	230.6	2.40	19	16	2						
Mersing, Johore	87.2	71.5	79.3	91	70	81	73	5.04	128.0	0.99	18	17	2						
Alor Star, Kedah	87.2	73.4	80.3	91	70	76	75	14.74	374.4	2.22	23	19	3						
Kota Bharu, Kelantan	-	73.4	-	-	71	-	75	10.84	275.3	1.94	18	15	5	3					
K. Trengganu, Trengganu	87.8	72.7	80.3	90	71	80	75	5.49	139.4	1.55	20	14	3	3					
HILL STATIONS.																			
Fraser's Hill,																			
Pahang 4268 ft.	74.1	61.8	67.9	77	59	72	63	11.61	294.9	1.84	26	24		9					
Cameron Highlands, Tanah																			
Rata, Pahang 4750 ft.	71.8	56.1	63.9	75	51	67	60	13.77	349.8	1.76	25	24	3	1					

Compiled from Returns supplied by the Malayan Meteorological Service.

METEOROLOGICAL SUMMARY, MALAYA, NOVEMBER, 1948.

LOCALITY.	AIR TEMPERATURE DEGREES FAHRENHEIT					EARTH TEMPERATURE		RAINFALL					BRIGHT SUNSHINE			
	Means of			Absolute Extremes		At 1 foot °F	At 4 feet °F	Total	Most in a day.	Number of days				Total	Daily Mean	Per cent.
	A.	B.	Min.	Highest	Lowest					Max.	Highest	Min.				
						Max.	Min.	Mean of A and B	Highest				Lowest	Max.	Highest	
Ipoh, Perak	89.0	72.2	80.6	94	70	79	75	ins.	m.m.	ins.	25	21	5			
Port Swettenham, Selangor	87.6	72.8	80.2	91	71	82	75	7.91	200.9	1.32	23	19	1	2		
K. Lumpur, Selangor	88.1	72.7	80.4	91	71	83	75	10.67	271.0	2.18	22	17	4	10		
Sitiawan, Perak	87.0	72.2	79.6	92	70	80	75	5.75	146.1	1.67	20	17				
Kuala Lipis, Pahang	85.1	71.3	78.2	91	70	75	73	13.32	338.3	3.11	24	18	1	18		
Kuantan, Pahang	85.0	71.0	78.0	90	67	76	74	19.57	497.1	6.62	21	19		2		
Tenerloh, Pahang	-	72.4	-	-	70	-	74	14.31	363.5	3.71	23	19		6		
Bayan Lepas, Penang	86.7	74.2	80.5	90	70	83	77	3.29	83.6	0.96	16	13	2			
Malacca	85.6	73.4	79.5	89	71	82	75	8.37	222.6	3.65	19	13	1			
Mersing, Johore	83.1	72.5	77.8	90	70	79	75	15.72	399.3	3.04	20	19	3			2
Alor Star, Kedah	86.9	72.2	79.7	91	66	82	75	5.18	131.6	1.31	18	14	2			
Kota Bharu, Kelantan	-	72.3	-	-	68	-	76	32.35	821.7	9.08	22	20	4			
K. Trengganu, Trengganu	-	72.6	-	-	70	-	77	42.98	1091.7	12.09	23	22		3		
HILL STATIONS.																
Fraser's Hill,																
Pahang 4268 ft.	70.3	61.1	65.7	76	60	65	63	15.00	381.0	2.88	25	22		18		
Cameron Highlands, Tanah																
Rata, Pahang 4750 ft.	70.5	56.6	63.5	75	51	65	62	8.77	222.8	2.10	26	24		3		

Compiled from Returns supplied by the Malayan Meteorological Service.